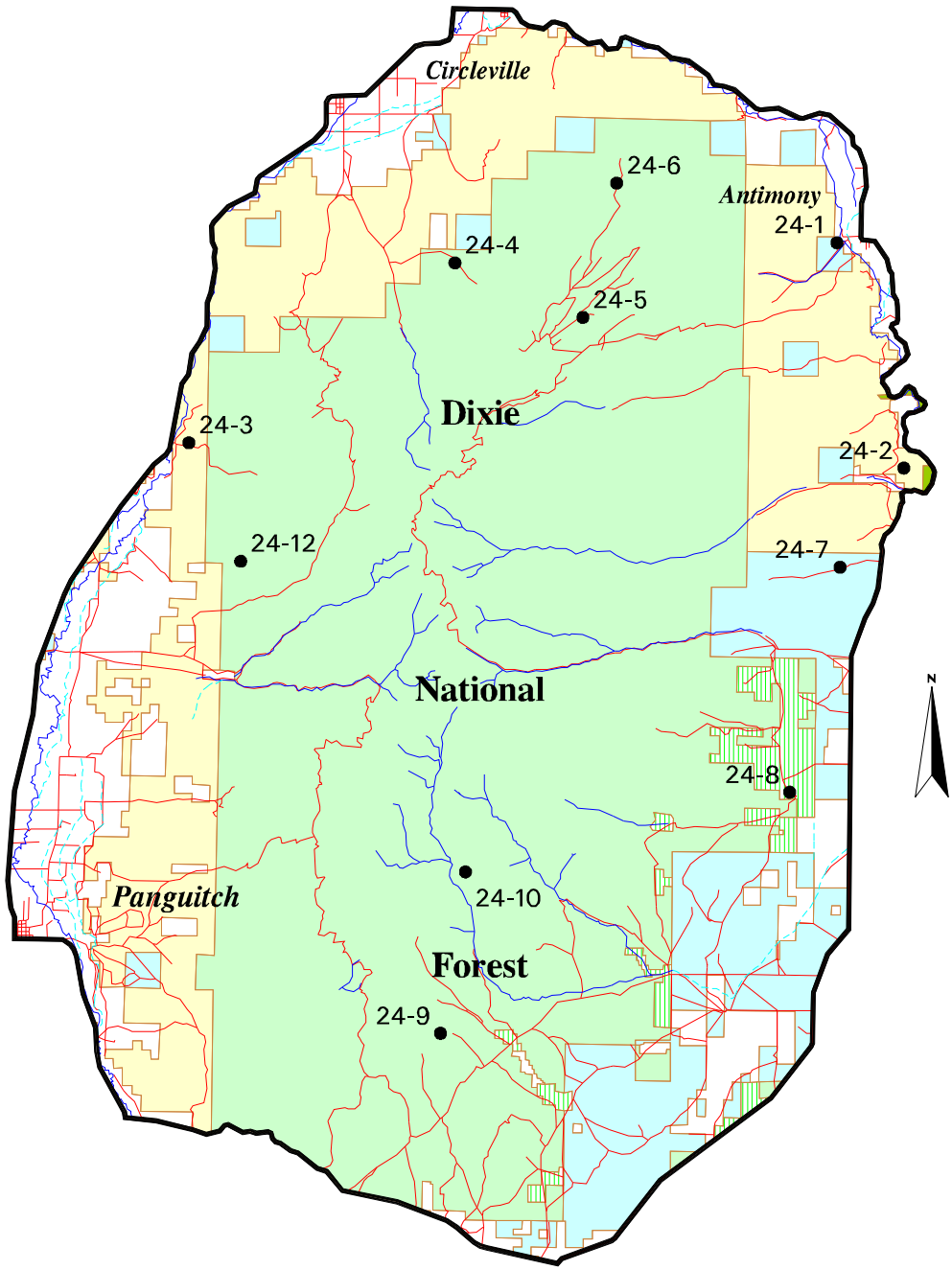
Management Unit 24

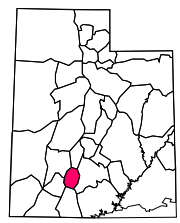


Map Scale 1:331,000 (1" = 5.2 miles)

Legend

- Forest Service
- BLM
- State of Utah
- Private Land
- Bankhead Jones
- State Wildlife Res.
- Water Body
- Transect Location
- Road
- Perennial Stream
- Ditch, Canal, Aqueduct

Unit Location



UDAF GIS May, 2000

WILDLIFE MANAGEMENT UNIT - 24 (46) - MT. DUTTON

Boundary Description

Garfield and Piute Counties - Boundary begins at the junction of Highways US-89 and SR-62; then south on US-89 to Highway SR-12; then east on SR-12 to the Widtsoe-Antimony Road; then north on this road to Highway SR-22; then north on SR-22 to SR-62; then west on SR-62 to US-89 and beginning point.

Herd Unit Description

The Dutton Unit is located at the southern end of one of several high plateaus in southern Utah that are the result of a long succession of volcanic activity which centered in the Tushar Mountains and extended south and east to create the Kolob, Sevier and Aquarius Plateaus. Table Mountain is an example of a lava capped plateau on the north end of the unit. Non-marine sedimentary rocks form the parent material for the soils at lower elevations on the southern and eastern portions of the unit. Mt. Dutton rises to an elevation of 11,036 feet near the center of the unit. The reader is directed to review the herd unit description given by Huff (1965) for information on the major drainages, municipalities and the limits of normal and severe deer winter range. Huff (1965) identified the vegetation composition of normal and severe deer winter range. The acreages for each type are presented below.

ACREAGE OF VEGETATION TYPES FOR NORMAL AND SEVERE WINTER RANGE

Vegetation Type	Acres	%
Pinyon-Juniper	97,500	66
Sagebrush	32,000	22
Mixed Types	10,900	8
Mountain Brush	0	0
Sagebrush-Rabbitbrush	900	1
Seedings	1,900	1
Agricultural Lands	2,600	2
TOTAL	145,900	100

The 1998 deer and elk management plans estimate 131,752 acres of deer and 114,892 acres of elk summer range on the unit. The majority of this range is on land administered by the U. S. Forest Service, 94% and 99% respectively. Winter range is estimated at 159,508 acres for deer and 71,951 for elk. Most of the winter range is on Forest Service lands, 51% and 70% respectively, but some occurs on BLM administered lands (36% and 10%).

Key Areas

Key winter range areas for deer were identified by the local interagency committee during the spring of 1987 and include the following areas: North Pole Canyon, Deer Creek Bench, North Bull Rush, Mud Springs, Cow Creek, and the Marshall Basin chaining. The elevation of these key areas range from 6,500 to 7,300 feet. Range types included in the monitoring effort are pinyon-juniper (chained and seeded), Wyoming big sagebrush, and black sagebrush.

Key areas for elk during the winter and summer periods were also identified by the local interagency committee and include: Suicide Pasture, Table Mountain, Cow Creek, Mud Spring Ridge, Barnhurst Ridge, and Prospect

Pasture. These sites range in elevation from 7,200 feet for winter range in Cow Creek to 9,600 feet for summer range in Suicide. The range types included in the monitoring effort are mixed alpine, black sagebrush, and mixed mountain brush.

Activities which have greatly influenced the vegetation composition on these key areas are livestock grazing, range seedings, prescribed burning, and logging. Since livestock grazing has impacted every key area, a discussion of the allotment management plans for each area gives important background information for these sites.

Livestock Grazing Summary

East Pines - C & H Allotment

Prior to 1954, sheep and cattle used the area now included in this allotment. Approximately 5,770 acres were dixie harrowed or plowed and seeded from 1949 to the early 1950's. From 1954-68, the unit was grazed on a deferred rotation system. Since 1968, it has been grazed by cattle only on a three pasture, rest-rotation system involving the Showalter, West Hunt, and East Hunt pastures. The Mud Spring trend study is located in the Showalter pasture. The Allotment Management Plan, prepared in 1965 and updated in 1977 found 23% of the pasture to be in good condition, 70% in fair condition, and 7% in poor condition. About 50% of the pasture which is suitable for livestock grazing was seeded in the early 1950's. The permittee uses this Forest Service allotment 6/1 to 10/10 and then grazes state land adjacent to U.S. Forest Land in Johns Valley in the fall from 10/10-12/1.

Hunt Creek
Cottonwood S & G Allotment

The allotment has been grazed by livestock since the 1860's. Livestock numbers have fluctuated from 50 to 140 cows and from 800-1,750 sheep. In addition, cattle drift in from adjacent areas to increase the level of use in the area. In 1953, the allotment was allocated to sheep only. From 1953-59 the allotment was composed of the West Hunt Creek S & G Allotment and the Prospect Creek - Spring Creek S & G Allotment. Active preference for the two units was 1,148 sheep from 6/15-9/30 each year (803 AUMs). In 1960, these two units were combined to form the Hunt Creek S & G Allotment. Stocking levels were reduced to 595 AUMs for the same period of use. In 1965, the same number of AUMs were authorized for a shorter grazing period (7/1-9/30). In 1981, the allotment was combined with the Cottonwood S & G Allotment. Numbers were changed to 1,200 from 6/16-10/10 (932 AUMs). Prior to this time, 400-450 AUMs had been allocated for sheep use in the Cottonwood Allotment since 1962. The Barnhurst Ridge trend study is located in the West Hunt Pasture which is grazed by 930 cattle as part of a 5 pasture deferred rotation grazing system.

Widtsoe C & H Allotment

The population in Johns Valley reached a peak population of 1,200 in 1915 as homesteaders attempted to dry farm. Lack of sufficient moisture forced the settlers to move. By 1935, most of the homesteads were purchased by the government through the Resettlement Act and returned to federal ownership. In 1960, an executive order gave sole jurisdiction of 14,825 acres to the BLM and 11,783 acres to the U.S. Forest Service. The Widtsoe Allotment was described as a separate unit and included inside the U.S. Forest Service boundary at that time. The unit was divided into three pastures in 1968 following the treatment of approximately 8,200 acres of sagebrush rangeland. A 1977 updated AMP shows that 88% of the treated area is in good condition, and 12% is only in fair condition. The native range (1,139 acres) is considered to be in fair condition, and 500 acres dominated by rabbitbrush are listed as being in poor condition.
The Prospect trend study is located in the lower Prospect Pasture which is grazed by 337 cattle from June 1st to

October 10th, as part of a three pasture deferred rotation system. The number of elk using this allotment has increased over the years during late winter and early spring months.

Jones Corral C & H Allotment

The Mud Springs and Suicide trend studies are located in the Mud Springs Division of the Jones Corral C & H Allotment. The Mud Springs site was chained and seeded in 1975 (2,418 acres). The Jones Corral Enclosure was also seeded.

The Mud Springs C & H allotment was established in 1969. Prior to 1955, seven permittees grazed 110 cattle season long. The cows drifted to higher elevations and caused overstocking problems in the vicinity of Jones Corral. Prior to the creation of the U.S. Forest Service, the Jones Corral area was grazed by a large number of sheep. It has since been converted to cattle and is the middle unit of a 3-pasture deferred rotation system involving two pastures in the Mud Springs chaining. Currently, the Mud Springs part of the unit is grazed by 208 cattle sometime between June 1st to October 10th depending on the rotation. Cattle do not get on to the Suicide area until mid-July.

Deer Creek Sheep Allotment

Three units make up this allotment: Horse Valley, Table Mountain and Deer Creek. The Marshall Basin trend study is located in the Horse Valley Unit, although the chained area has been set aside for wildlife. The Table Mountain study is located in the Table Mountain Unit.

The Horse Valley Unit was grazed with cattle and horses prior to 1922. After 1922, it was switched over to sheep use, and numbers varied from 1,076 prior to 1924 to 900 in 1931 following a 10% reduction. Table Mountain has always been sheep range. Cattle have drifted from the Jones Corral Unit onto Table Mountain, and sheep have drifted into the cattle allotment. For the past few years, sheep have been kept off the Table Mountain area.

Pine Creek Allotment - BLM

This allotment historically has provided spring and fall range for cattle. For the grazing history of this area and the percent composition of the various condition classes for suitable grazing land, the reader is referred to the BLM Resource Management Plan for the area. Active preference is 691 AUM's on the federal portion and 62 AUM's on the state with spring and fall cattle use.

The North Pole Canyon and Cow Creek trend studies are located on state land adjacent to this allotment.

Herd Unit Management Objectives

The current management objectives for deer are to achieve a target population size of 2,400 wintering deer with a post season buck to doe ratio of 15:100 and 30% of these bucks being three point or better. The elk management objective is to achieve a target winter population of 900 elk with a minimum post season bull to cow ration of 14:100 and at least 70 of these bulls being 2 ½ years of age or older. The bull elk harvest objective is to provide opportunity for a 60% bull harvest success ratio and 40% of the harvest being 2 ½ year or older bulls. The bull harvest will be managed to average 3 to 4 year old animals.

Herd Unit Status

The buck deer harvest averaged 201 between 1990 and 1995. This is a major decline from the previous four years (1986 to 1989) which averaged 565 bucks harvested per year. The fawn/doe ratio is currently marginal with 49 fawns/100 does estimated during the 1994-95 and 1995-96 seasons. Since 1991-92, the ratio has averaged only 54 fawns/100 does. Poor fawn production was also found in 1989-90 and 1990-91 at 34 and 42 fawns/100 does respectively. Prior to those years fawn production was much higher averaging 72 fawns/100 does between 1986-87 and 1988-89.

The Mt. Dutton unit is a limited entry elk unit. Harvests have averaged 41 bulls between 1991 and 1995. Antlerless permits have been issued during each season with the exception of 1992. A high of 207 antlerless permits were issued in 1995. Elk calf production has improved since the severe winter of 1991-92 when only 20 calves/100 cows were estimated. In 1994-95, that ratio increased to 52 calves/100 cows.

Study Site Description

A total of 11 trend study sites were established on the unit in 1987. These sites were reread in 1991 and 1997. Study sites monitor important winter, spring/winter and summer range for elk and deer. Seven of the 11 study areas occur on Forest Service land with two on BLM land and two on land administered by the DWR. A site description for each site follows along with data tables and a discussion of trends taking place.

Trend Study 24-1-97

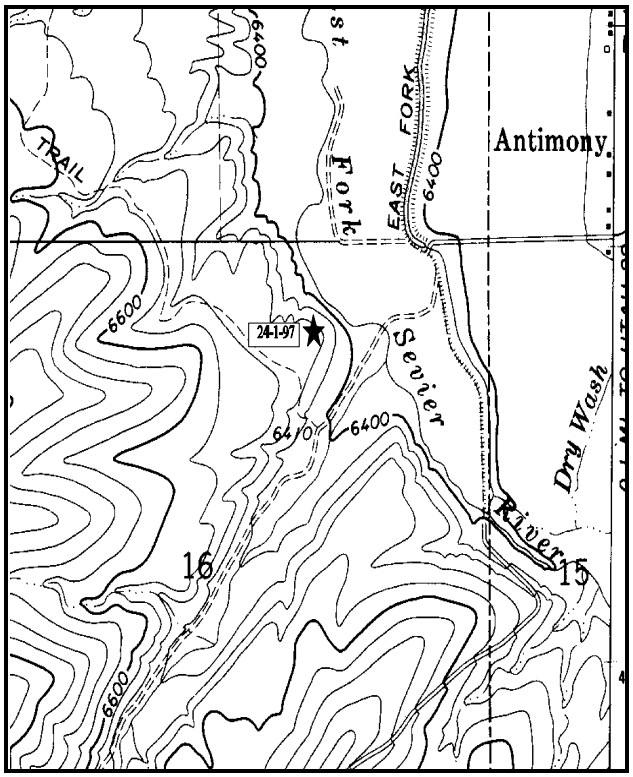
Study site name: North Pole Canyon . Range type: Big Sagebrush .

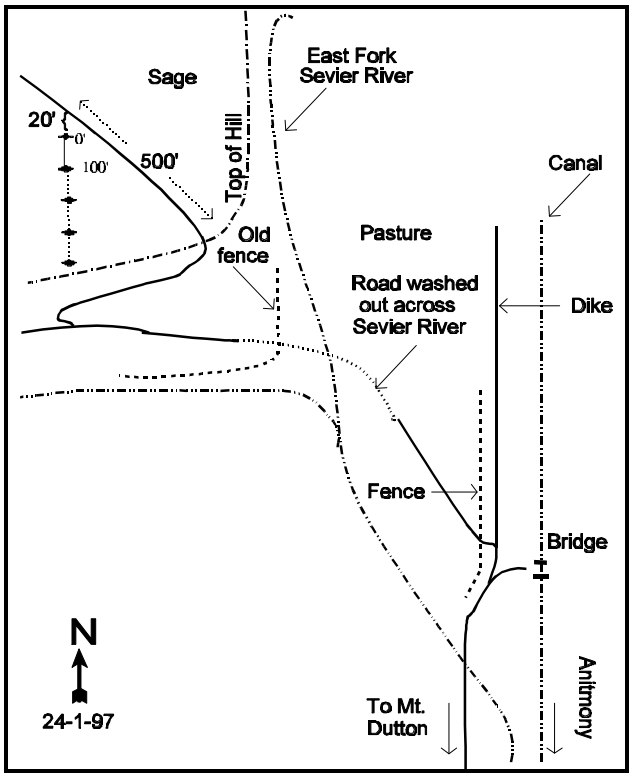
Compass bearing: frequency baseline 165 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement: line 1 (11 & 95ft.), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the town of Antimony, drive west on the Mt. Dutton road for approximately 1/2 mile to a canal and bridge. Just past the canal bridge, turn right, go through a gate and bear left down towards the Sevier River. Go 0.1 mile to another gate. Go through the gate and continue 0.2 miles across a field to the river. The old road is washed out, so cross the river on foot and hike up the hill to the southwest along an old jeep trail. The transect is on top of the hill and starts 20 feet south of the old road. The study is marked by short, green fence posts. There is a browse tag on the 1st baseline stake.





Map Name: Deep Creek Diagrammatic Sketch

Township 31S , Range 2W , Section 16 UTM 4218738.463 N,411279.037 E

DISCUSSION

Trend Study 24-1 (50-1)

The North Pole Canyon study is located on a bench above the East Fork of the Sevier River and about one-half mile from the town of Antimony. The site is at an elevation of about 6,520 feet with a gentle 4% slope and a slight northeast aspect. It is a key area for wintering mule deer. Deer concentrate on the bench and utilize forage from adjacent agricultural lands in the valley during the spring and fall. Cattle use this area in the spring, and it appears as though the area has been overstocked. This area receives, on average, close to 10 inches of annual precipitation. The 1986 annual precipitation total for Angle, Utah, was only about 7 inches, which probably was indicative of a below average water year for the Antimony area also. This low rainfall exacerbated the use made during the spring of 1987. This site does not receive any pressure from people since the jeep trail across the East Fork of the Sevier River has been washed out. The only activities on this bench are those associated with livestock.

Soil on the site is relatively shallow with an effective rooting depth (see methods) estimated at 12 inches. The soil profile is very rocky with considerable amounts of rock and pavement on the surface (28%). Soil temperature is relatively high averaging 61°F at an average depth of 11 inches. Soil texture is a sandy clay loam with a neutral pH (6.8). Organic matter is limited at 1.3%, the lowest level of all the sites on the unit. The soil is vulnerable to erosion with an average of about 33% bare soil since 1987. Pedestalling around plants, especially the older sagebrush, is evident and small active gullies are found on the site. Litter is limited averaging 38% in 1991, but declining to only 16% in 1997. It is restricted mainly to the area directly beneath the sagebrush canopy.

The key species is Wyoming big sagebrush, which currently accounts for 100% of the shrub cover. The stand was fairly dense in 1987 with an estimated 5,998 plants/acre. Many of the interspaces were occupied by seedlings (3,433/acre) in 1987. Young plants were also common at that time accounting for 48% of the population. However, sagebrush density dropped 27% by 1991 to 4,399 plants/acre and the number of decadent plants increased from 9% to 51%. In addition, 72% of the decadent plants were classified as dying. During the 1997 reading, the population remained relatively stable at 4,420 plants/acre. Percent decadence declined to 12% and recruitment is good with a reproductive potential (percentage of seedlings to the population) of 8% with 39% of the population consisting of young plants. Vigor is normal on most plants. The stand has received considerable use by deer in the past. Eighty-four percent of the shrubs (seedlings not included) were moderate or heavily hedged in 1987 with this number declining to 38% in 1991. Use has since declined with less than one percent of the sagebrush sampled displaying heavy use in 1997, 8% were moderately hedged.

Herbaceous species are lacking in the area. Blue grama is the primary grass. Perennial forbs are nearly absent but weedy annual forbs consisting of goosefoot, nodding eriogonum, and stickseed, are abundant and currently provide more cover than grasses.

1991 TREND ASSESSMENT

Soil trend appears to be stable, but in very poor condition. Recent gullies formed by flash floods are evident and there is potential for gullies to enlarge with the lack of cover in the interspaces. The dominant overstory is Wyoming big sagebrush. Although heavy hedging has decreased by nearly 30%, the sagebrush population went from 9% decadent to 51% decadent, showing a downward trend. The increase in weedy annual forbs and no desirable species is a cause for concern. Grasses have also decreased slightly on the site.

TREND ASSESSMENT

soil - stable, but in poor condition
browse - down
herbaceous understory - down

1997 TREND ASSESSMENT

Trend for soil is stable, but still in poor condition. Percent bare ground has declined slightly since 1991 with litter cover also decreasing. Trend for Wyoming big sagebrush is up slightly. Density has remained relatively similar to 1991 estimates. However, utilization is lighter, vigor improved and percent decadence has declined from 51% to 12%. Trend for the herbaceous understory is stable. Sum of nested frequency of grasses has remained similar to 1991 estimates with the frequency of forbs increasing. However, five of the six forbs encountered in 1997 are weedy annuals consisting of goosefoot, nodding eriogonum, and stickseed. These weedy species account for more than 99% of the forb cover. The only perennial forb encountered on the site was Utah milkvetch which occurred in only 2 of the 100 quadrats.

TREND ASSESSMENT

soil - stable, but in poor condition
browse - up slightly
herbaceous understory - stable, but poor forb compostion

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 1

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Bouteloua gracilis	$_{b}$240	$_{a}$210	$_{a}$203	80	79	75	7.00
G	Bromus tectorum (a)	1	-	-	1	-	-	-
G	Oryzopsis hymenoides	3	1	-	1	1	-	.00
G	Sitanion hystrix	2	-	-	1	-	-	-
G	Sporobolus cryptandrus	$_{b}$15	$_{ab}$9	$_{a}$1	10	5	1	.01
G	Stipa comata	$_{b}$4	$_{a}$-	$_{ab}$1	4	-	1	.00
Total for Grasses		265	220	205	97	85	77	7.02
F	Astragalus utahensis	-	-	2	-	-	2	.01
F	Chenopodium fremontii (a)	$_{a}$10	$_{b}$75	$_{c}$194	5	38	75	6.01
F	Chenopodium leptophyllum (a)	-	-	108	-	-	42	1.19
F	Eriogonum cernuum (a)	$_{a}$-	$_{a}$3	$_{b}$83	-	1	33	1.09
F	Lappula occidentalis (a)	-	-	24	-	-	10	.05
F	Salsola iberica (a)	3	-	-	1	-	-	-
Total for Forbs		13	78	411	6	39	162	8.36

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 1

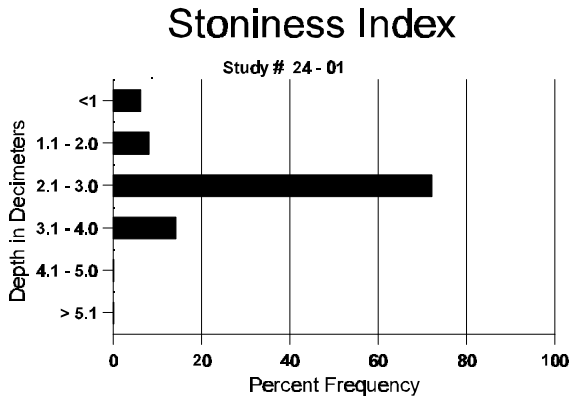
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	75	6.47
B	Chrysothamnus nauseosus	1	-
B	Sclerocactus	2	-
Total for Browse		78	6.47

BASIC COVER --
Herd unit 24 , Study no: 1

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	298	14.50	6.75	21.54
Rock	259	6.75	4.75	7.22
Pavement	355	15.00	16.25	20.33
Litter	368	29.00	38.00	16.26
Cryptogams	14	0	0	.18
Bare Ground	330	34.75	34.25	29.45

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 01

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.1	61.0 (10.9)	6.8	52.7	22.7	24.6	1.3	12.3	188.8	1.2



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 1

Type	Quadrat Frequency '97
Rabbit	7
Elk	1
Deer	20
Cattle	5

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 1

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	87	103	-	-	-	-	-	-	-	-	103	-	-	-	3433			103
	91	-	-	-	4	-	-	-	-	-	4	-	-	-	133			4
	97	15	-	-	3	-	-	-	-	-	18	-	-	-	360			18
Y	87	24	50	12	-	-	-	-	-	-	71	-	15	-	2866			86
	91	14	3	1	6	-	-	6	-	-	29	-	-	1	1000			30
	97	81	-	-	5	-	-	-	-	-	84	-	-	2	1720			86
M	87	3	16	58	-	-	-	-	-	-	77	-	-	-	2566	13	18	77
	91	13	11	4	4	3	-	-	-	-	35	-	-	-	1166	12	19	35
	97	90	14	1	-	4	-	-	-	-	109	-	-	-	2180	18	26	109
D	87	2	8	7	-	-	-	-	-	-	13	-	-	4	566			17
	91	24	4	5	22	2	1	1	-	8	19	-	-	48	2233			67
	97	26	-	-	-	-	-	-	-	-	11	-	-	15	520			26
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	1	-	-	-	840			42

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	41%	43%	11%	-27%
'91	17%	14%	37%	+ 0%
'97	08%	.45%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	5998	Dec:	9%
	'91	4399		51%
	'97	4420		12%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceratoides lanata																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	1	-	-	-	-	-	-	1	-	-	-	33			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	2	-	-	-	-	-	-	-	3	-	-	-	100	12	2	3
	91	1	-	2	1	-	-	-	-	-	4	-	-	-	133	7	7	4
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	50%	25%	00%	+ 0%
'91	00%	50%	00%	Died out
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	133	Dec:	-
	'91	133		-
	'97	0		-

Chrysothamnus nauseosus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	-	-	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	80		-

Sclerocactus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	11	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	60		-

Trend Study 24-2-97

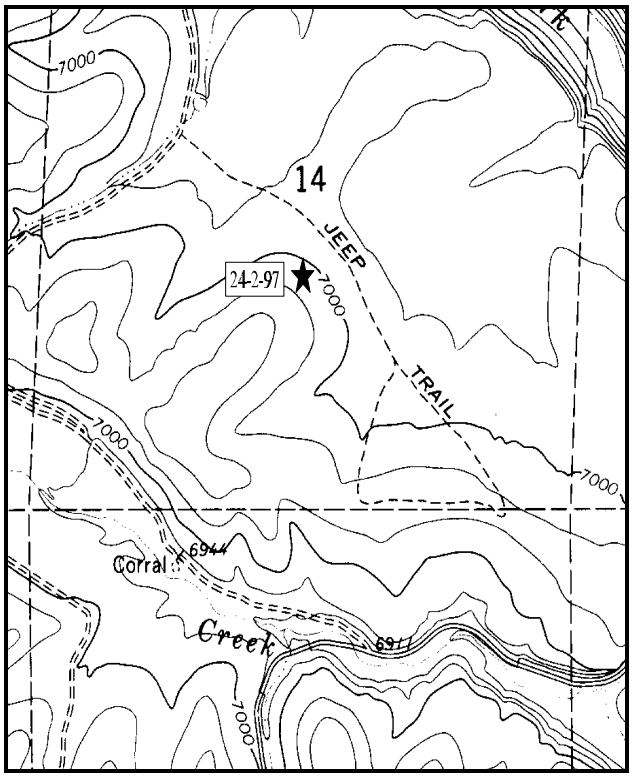
Study site name: Deer Creek Bench . Range type: Black Sagebrush .

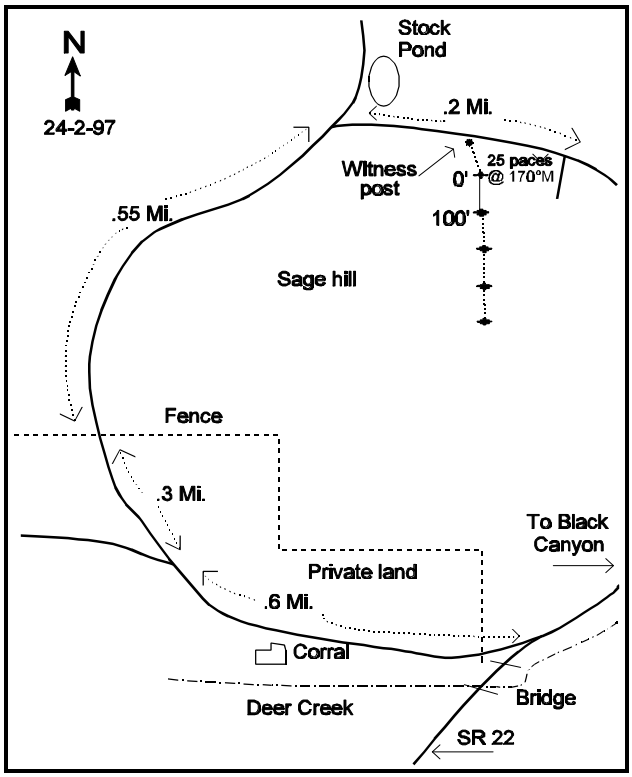
Compass bearing: frequency baseline 168 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From SR22 in the southern end of Black Canyon, follow the highway up Deer Creek to a bridge. Immediately north of the bridge, turn hard left. Take this road, which crosses private land, northwest for 0.4 miles to a corral. Stay right and continue 0.2 miles to a fork. Bear right, go 0.3 miles to a fence. Continue 0.55 miles to a fork by a stockpond. Turn right onto the jeep trail and proceed 0.2 miles to the study area. There is a witness post located on the right side of the road. Walk approximately 25 paces bearing 170 degrees to the 0-foot baseline stake. The study is marked by 2-foot tall fence posts. The 0-stake has a red browse tag, #9100, attached. The transect runs south up the hill.





Map Name: Antimony Diagrammatic Sketch

Township 32S , Range 2W , Section 14 UTM 4209453.243 N, 414332.270 E

DISCUSSION

Trend Study 24-2(50-2)

The Deer Creek trend study is located on the east side of the unit in an area characterized by a broad, gently sloping (11%) surface with low relief that is situated near the base of steeper slopes that rise up to the Sevier Plateau. The area is covered with alluvial gravel and sand over bedrock. The key browse species are Wyoming big sagebrush and black sagebrush. This is a key winter use area for mule deer that is also utilized by a growing herd of antelope. Numerous deer pellet groups and several antler drops were found in the area during each reading. Pellet group data from 1997 estimate there to be 121 deer use days/acre. Elk also lightly use the area with 8 elk use days/acre estimated in 1997. Escape and thermal cover are not present on the site, but some is located one-half mile to the west. It appears as though the area currently is used lightly by livestock (6 cow use days/acre). A stock pond is one-quarter mile away, and Deer Creek is three-quarters of a mile from the study. There are no other known uses of the area and human pressure is assumed to be minimal during the year.

The soils are a coarse textured, sandy loam. A large portion of the surface is covered with an erosion pavement and rock. The soil is fairly shallow with an effective rooting depth estimated at almost 14 inches. The soils lack a well-developed organic layer. There is an abundance of small pebbles and large gravel on the surface and through the soil profile down to a depth of six to eight inches. Few rocks are found below eight inches. At about 10 to 12 inches in depth, a light colored more sandy horizon is found. Patches of bare ground are interspersed among the rocks, litter, and vegetation. Most of the litter is found beneath the shrub canopy. There is not much evidence of excessive erosion on this site.

A fairly dense stand of black sagebrush occupies the site. Density has varied over the years primarily due to identification problems with black sagebrush and Wyoming big sagebrush. There is also some pygmy sagebrush on the site which was lumped with black sagebrush in 1997. During the 1987 reading, Wyoming big sagebrush had an estimated density of 5,598 plants/acre. The average mature plant measured 15 inches in height. Black sagebrush had a population of 4,398 plants/acre with mature shrubs averaging 13 inches in height. During the 1991 reading, the Wyoming big sagebrush population was estimated at only 66 plants/acre, while density of black sagebrush increased to 8,532 plants/acre. The much larger sample used in 1997 found no Wyoming big sagebrush in the shrub density strips, but some plants were found and measured for height/crown measurements. Black sagebrush remained at similar densities to 1991 estimates at 8,480 plants/acre. Mature plants currently account for 78% of the population. There are some downward indications of a slightly downward trend in the population. These would include a biotic potential that has been steadily declining along with the percentage of young plants in the population. Additionally, the percentage of decadent plants classified as dying has also steadily increased to where it is at a high of 48%.

Slenderbush eriogonum provides some additional forage on the site with a current density of 5,600 plants/acre. These shrubs are small averaging only 3 inches in height and provide only 5% of the total shrub cover. Narrowleaf low rabbitbrush was encountered in the larger sample used in 1997. It currently has an estimated density of 3,060 plants/acre, 94% of which are mature. Broom snakeweed is also found on the site and there may have been some identification problems between it and rabbitbrush during past readings.

Herbaceous plants are rare. Bottlebrush squirreltail, Indian ricegrass, and needle-and-thread are the only perennial grasses found on the site. These three perennial species produced only 4% of the total cover in 1997. Ten forb species were encountered in 1997, but only trailing fleabane and scarlet globemallow occur more than rarely. All forbs combined produces less than one percent cover in 1997. They are probably of limited value to mule deer during the spring.

1991 TREND ASSESSMENT

Basal vegetative cover and litter cover have both declined since the last survey, from 9% to 3%, and 25% to 17%, respectively. Collectively, rock and pavement cover have increased somewhat from 47% to 54%. This data would indicate a downward trend for soil. Trend for browse has become somewhat more difficult to determine since the survey in 1987. Black sagebrush and Wyoming sagebrush are considered combined for this analysis since they are so similar with a lot of hybridizing between the two populations. Whether they are separated or not, they both are considered the key browse species on this site. Collectively, the density has decreased from 9,996 down to 8,598 plants per acre, a decrease of 14% in the population. Amount of heavy hedging has decreased from 58% to 36% but poor vigor and dying vigor classes have increased from 2% to 21%. Trend for browse would be down even with a notable decrease in the broom snakeweed population. The herbaceous understory is about the same for the grasses, but the forbs are mostly on the decline. The trend would be stable to slightly declining. An extended period of drought has been responsible for much of this downward trend.

TREND ASSESSMENT
soil - slightly downward
browse - slightly downward
herbaceous understory - stable to slightly downward

1997 TREND ASSESSMENT

The soil trend appears to have improved slightly since 1991. Percent bare ground has declined from 24% to 13% and rock/pavement cover has also declined from 54% to 39%. Percent litter cover has remained at similar levels to 1991 estimates. In addition, sum of nested frequency of grasses has increased slightly. Trend for the key browse, black sagebrush, is considered stable to slightly down. Density has remained steady, moderate and heavy use has declined from 81% to 36%, vigor has improved and percent decadence declined from 55% to 15%. However, biotic potential and percent young age class has steadily decreased since 1987, along with a steady increase in the percentage of decadent plants being classified as dying where it is now at a high of 48%. Trend for the herbaceous understory is up slightly but still depleted with grass and forb cover producing only 5% total cover.

TREND ASSESSMENT
soil - up slightly, but in poor condition
browse - stable to slightly down
herbaceous understory - up slightly but depleted

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 2

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Bromus tectorum (a)	-	-	3	-	-	1	.00
G	Oryzopsis hymenoides	$_{a}$9	$_{a}$11	$_{b}$73	6	6	27	2.04
G	Sitanion hystrix	126	98	101	59	52	47	1.66
G	Stipa comata	$_{a}$-	$_{ab}$7	$_{b}$14	-	3	8	.26
Total for Grasses		135	116	191	65	61	83	3.97
F	Antennaria rosea	-	-	2	-	-	1	.00
F	Arabis spp.	$_{b}$9	$_{a}$-	$_{ab}$5	5	-	3	.01
F	Astragalus spp.	$_{b}$20	$_{b}$24	$_{a}$4	10	11	2	.01
F	Astragalus utahensis	-	-	6	-	-	2	.01
F	Chenopodium spp. (a)	-	-	18	-	-	8	.04
F	Cruciferae	5	-	-	3	-	-	-
F	Erigeron pumilus	$_{b}$48	$_{a}$19	$_{b}$41	25	11	22	.31
F	Gayophytum ramosissimum (a)	-	-	35	-	-	12	.08
F	Paronychia spp.	$_{b}$19	$_{b}$21	$_{a}$-	10	9	-	-
F	Phlox longifolia	13	20	6	4	10	2	.01
F	Senecio multilobatus	1	-	-	1	-	-	-
F	Sphaeralcea coccinea	$_{b}$60	$_{b}$58	$_{a}$31	28	28	16	.20
Total for Forbs		175	142	148	86	69	68	0.69

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 2

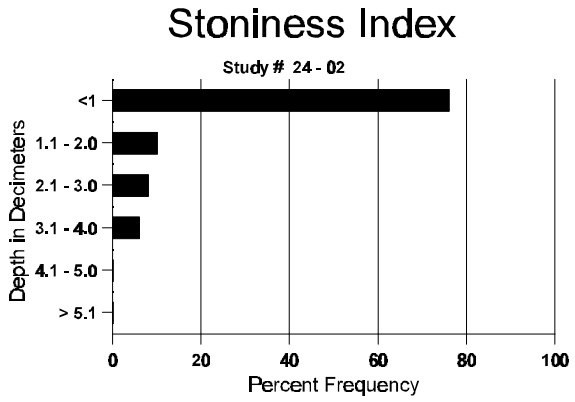
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia nova	93	16.65
B	Artemisia pygmaea	22	.82
B	Artemisia tridentata wyomingensis	0	-
B	Ceratoides lanata	1	-
B	Chrysothamnus viscidiflorus stenophyllus	47	2.23
B	Eriogonum microthecum	53	1.14
B	Gutierrezia sarothrae	4	-
B	Opuntia spp.	4	-
Total for Browse		224	20.87

BASIC COVER --
Herd unit 24 , Study no: 2

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	288	8.50	2.75	25.71
Rock	301	16.75	8.75	11.87
Pavement	363	30.00	45.25	27.52
Litter	361	24.50	17.00	16.72
Cryptogams	67	1.50	2.00	.34
Bare Ground	306	18.75	24.25	13.28

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 02

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.9	51.0 (14.9)	7.1	61.0	23.1	15.9	1.8	13.6	92.8	.5



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 2

Type	Quadrat Frequency '97
Rabbit	2
Elk	3
Deer	46
Cattle	3

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 2

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	91	10	-	-	-	-	-	-	-	-	10	-	-	-	666			10
	97	10	-	-	1	-	-	-	-	-	11	-	-	-	220			11
Y	87	7	2	1	-	-	-	-	-	-	10	-	-	-	666			10
	91	9	10	1	-	-	-	-	-	-	19	-	1	-	1333			20
	97	38	-	-	1	-	-	-	-	-	39	-	-	-	780			39
M	87	2	9	23	-	-	-	-	-	-	34	-	-	-	2266	13	17	34
	91	4	15	15	1	3	-	-	-	-	37	-	1	-	2533	11	20	38
	97	131	65	15	-	3	-	-	-	-	214	-	-	-	4280	12	23	214
D	87	-	4	18	-	-	-	-	-	-	20	-	-	2	1466			22
	91	10	30	27	-	1	2	-	-	-	45	-	17	8	4666			70
	97	18	26	-	-	-	-	-	-	-	22	-	-	22	920			46
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	780			39

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	23%	64%	03%	+48%
'91	46%	35%	21%	-30%
'97	31%	05%	07%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	4398	Dec:		33%
'91	8532			55%
'97	5980			15%

Artemisia pygmaea																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	3	-	-	-	-	-	-	-	8	-	-	-	160			8
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	90	27	-	-	-	-	-	-	-	117	-	-	-	2340	2	7	117

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	24%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	0	Dec:	-
'91	0		-
'97	2500		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	87	18	-	-	-	-	-	-	-	-	18	-	-	-	1200			18
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	18	5	2	-	-	-	-	-	-	25	-	-	-	1666			25
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	7	29	-	-	-	-	-	-	37	-	-	-	2466	15	23	37
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	87	-	8	14	-	-	-	-	-	-	21	-	-	1	1466			22
	91	-	-	1	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	24%	54%	01%	-99%
'91	00%	100%	00%	Died out
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	5598	Dec:		26%
'91	66			100%
'97	0			0%

Atriplex canescens																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	19	20	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	1	-	-	-	-	-	-	-	-	1	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	100%	100%	Died out
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	66	Dec:		0%
'91	66			100%
'97	0			0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceratoides lanata																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	4	8	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'91	0			-
'97	20			-

Chrysothamnus viscidiflorus stenophyllus																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	8	12	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	142	2	-	-	-	-	-	-	-	144	-	-	-	2880	6	12	144
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	00%	00%	+98%
'97	01%	00%	.65%	

Total Plants/Acre (excluding Dead & Seedlings)			
'87	66	Dec:	0%
'91	66		100%
'97	3060		1%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum microthecum																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	91	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	97	32	-	-	-	-	-	-	-	-	32	-	-	-	640			32
M	87	51	-	-	-	-	-	-	-	-	51	-	-	-	3400	3	3	51
	91	10	11	5	3	-	-	-	-	-	29	-	-	-	1933	2	2	29
	97	212	12	-	24	-	-	-	-	-	248	-	-	-	4960	3	5	248

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-37%
'91	32%	15%	00%	+60%
'97	04%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	3600	Dec:	-
	'91	2266		-
	'97	5600		-

Gutierrezia sarothrae																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	10	-	-	-	-	-	-	-	-	10	-	-	-	666			10
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	19	-	-	-	-	-	-	-	-	19	-	-	-	1266	8	9	19
	91	16	-	-	1	-	-	-	-	-	17	-	-	-	1133	5	4	17
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	8	7	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-41%
'91	00%	00%	00%	-93%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	1932	Dec:	-
	'91	1133		-
	'97	80		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	5	-	-	-	-	-	-	-	-	5	-	-	-	333			5
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	3	-	-	1	-	-	-	-	-	4	-	-	-	80	4	4	4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Appeared
'91	00%	00%	00%	-76%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	333		-
	'97	80		-

Trend Study 24-3-97

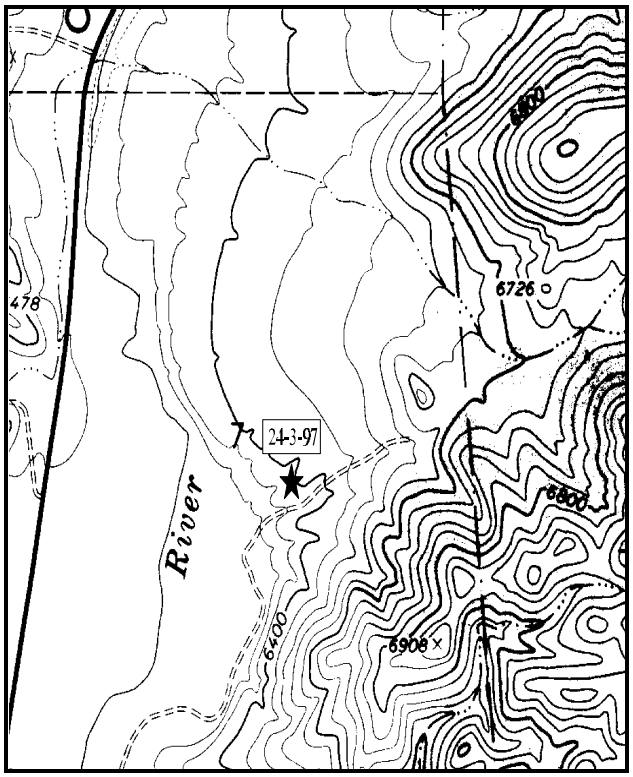
Study site name: North Bull Rush . Range type: Big Sage-Grass .

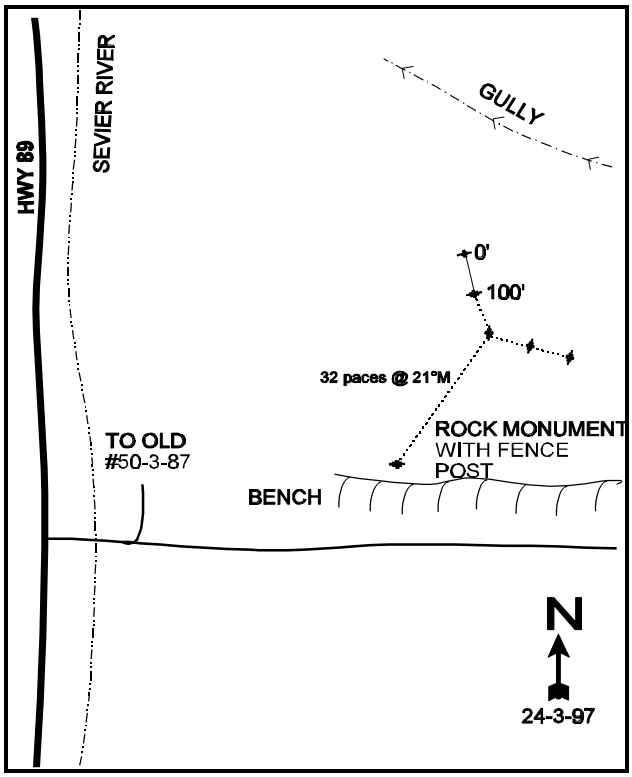
Compass bearing: frequency baseline 348 degrees. (Lines 3& 4 96 degrees)

First frame placement on frequency belts 5 feet. Frequency belt placement: line 1 (11 & 95 ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Highway 89 and SR20 Junction, proceed north on 89 for 5.4 miles. Here at the beginning of Circleville Canyon, turn right off the highway onto a dirt road. Cross the Sevier River, and go 0.15 miles to a gate and intersection. Go straight for another (east) 0.5 miles. Stop here. Walk 18 paces up on the edge of a low bench on the north side of the road at an azimuth of 356° magnetic to a rock monument with a fencepost. Walk approximately 60 paces at an azimuth of 9° magnetic to the 100' baseline stake.





Map Name: Bull Rush Peak Diagrammatic Sketch

Township 32S , Range 4 1/2W , Section 7 UTM 4209603.538 N, 381687.333 E

DISCUSSION

Trend Study 24-3 (50-3)

The North Bull Rush study is located 1/4 mile west of the Forest Service boundary on BLM land. The sagebrush covered bench slopes gradually (3% to 5%) to the northwest at an elevation of 6,400 feet. The Sevier River is one-half mile west of the site. Agricultural land is located in the valley bottom between the site and the river. The bench is relatively small, a half mile long and a half mile wide at the widest point, and is dissected by numerous small gullies. This site is a key area for deer during the winter and spring.

This BLM allotment is grazed with cattle by the adjacent private landowner. No sign of cattle was encountered in 1991, but some cattle sign was found in 1997. Deer pellet groups were abundant in 1991 and an antler drop was also found on the site that year. Few elk pellet groups were found and some sheep sign was also noted in 1991. During the 1997 reading, deer pellet groups were abundant with a quadrat frequency of 41%. A few elk groups were also encountered.

The soil has a sandy loam texture with a considerable amount of pavement on the surface which is evidence of a long history of soil loss from the site. It is characteristic of the alluvial deposits that formed the low-lying foothills on the unit. Effective rooting depth (see methods) was estimated at just over 13 inches with a relatively high soil temperature (for this elevation) of almost 58°F at an average depth of nearly 16 inches. Some small gullies in the area are experiencing some down-cutting problems. Organic matter is limited in the soil at only 1.4%. Phosphorus may also be limiting at only 7.1 ppm where the minimum is thought to be 10 ppm.

Wyoming big sagebrush is both the dominant and key browse overstory on the site, with blue grama and needle-and-thread grass providing most of the herbaceous cover. Very few forbs are present. The sagebrush population was predominantly mature (69%) in 1987, with 14% young plants scattered throughout the stand and a reproductive potential (percentage of seedlings to the population) of 1%. Shrub density was fairly high at 6,666 plants/acre. Data from 1991 indicate a 19% drop in the population to 5,400 plants/acre. No seedlings were found and the number of young plants also dropped to 7%. Percent decadency increased dramatically from 17% to 67%. The area receives a considerable amount of use by deer during the winter and early spring. This browse use has been exacerbated by the extended drought. Eighty-five percent of the sagebrush plants showed evidence of heavy hedging in 1987. Utilization in 1991 was more moderate with only 38% of the sagebrush showing heavy use. Poor vigor increased between 1987 and 1991 from 3% to 32%. Additionally, 31% of the decadent sagebrush were classified as dying in 1997. During the 1997 reading, density remained similar, vigor improved, and percent decadence is down to 48%, but still very high. Utilization is more moderate with only 7% of the sagebrush sampled displaying heavy use. Reproductive potential is up from 0 to 3% but the proportion of young plants in the population continues to decline.

Species diversity is very limited on this site, as is the case with most Wyoming big sagebrush communities. The herbaceous understory is composed mostly of blue grama, bottlebrush squirreltail, and needle-and-thread grass. These three grasses produced 10% cover in 1997. Forbs are almost nonexistent.

1991 TREND ASSESSMENT

The soil trend would be considered slightly downward because of some of the key parameters measured. Vegetative basal cover and litter cover both declined while both pavement and bare ground increased since 1987. Trend for the key browse species, Wyoming big sagebrush, is down. It's population has decreased by 19% with the rate of decadency going from 17% to 67%. The herbaceous understory is slightly declining. The most abundant grass, needle-and-thread, is stable with an 85% quadrat frequency. Nested frequency of blue grama and bottlebrush squirreltail have declined significantly. The forbs are almost nonexistent on this site, but with what few species are present, all have declining quadrat frequencies.

TREND ASSESSMENT
soil - slightly downward
browse - down
herbaceous understory - slightly downward

1997 TREND ASSESSMENT

Trend for the soil is stable but in poor condition due to the lack of herbaceous vegetation and litter cover. Percent bare ground, litter, and pavement cover are similar to 1991 estimates. Trend for Wyoming big sagebrush is slightly down due to a still moderately high percent decadency (48%), decline in percent young age class, and that the percentage of decadent plants classified as dying has steadily increased since 1987. It is currently at its highest it has ever been. This would mean than over 800 plants would be added to the dead plants which already make up 33% of the population. Recruitment is poor and the population could decline further in the future if the proportion of seedlings and young do not improve. Trend for the herbaceous understory appears stable. Sum of nested frequency of grasses and forbs have remained similar to 1991 estimates. Nested frequency of the dominant grass, needle-and-thread, remains constant but the frequency of blue gramma increased significantly while the nested frequency of bottlebrush squirreltail declined significantly.

TREND ASSESSMENT
soil - stable, but in poor condition
browse - slightly down
herbaceous understory - stable, but depleted

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 3

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Bouteloua gracilis	$_{b}$222	$_{a}$96	$_{a}$114	78	44	48	1.88
G	Bromus tectorum (a)	-	-	-	-	-	-	.00
G	Sitanion hystrix	$_{c}$138	$_{b}$76	$_{a}$35	56	39	14	.70
G	Sporobolus cryptandrus	$_{a}$-	$_{b}$16	$_{b}$10	-	10	5	.10
G	Stipa comata	220	236	243	85	85	89	7.52
Total for Grasses		580	424	402	219	178	156	10.21
F	Astragalus spp.	16	4	6	7	2	2	.01
F	Chenopodium spp. (a)	-	-	11	-	-	6	.03
F	Cryptantha fulvocanescens	7	-	-	3	-	-	-
F	Erigeron pumilus	19	3	7	8	2	6	.03
F	Gilia spp. (a)	-	-	3	-	-	1	.00
F	Mammillaria spp.	3	-	-	1	-	-	-
Total for Forbs		45	7	27	19	4	15	0.07

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 3

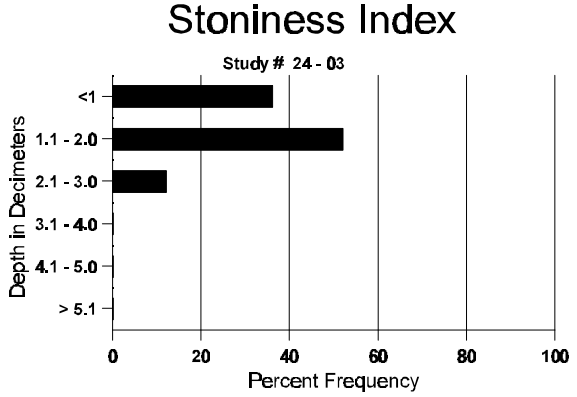
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	91	13.67
B	Ceratoides lanata	1	-
B	Chrysothamnus viscidiflorus	4	.15
B	Opuntia spp.	3	.18
Total for Browse		99	14.00

BASIC COVER --
Herd unit 24 , Study no: 3

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	299	11.75	9.25	25.75
Rock	152	2.25	1.00	1.43
Pavement	355	30.75	36.25	35.46
Litter	395	39.50	30.75	28.81
Cryptogams	48	1.25	1.75	.72
Bare Ground	312	14.50	21.00	17.67

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 03

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.4	57.8 (15.7)	6.7	60.4	20.1	19.6	1.4	7.1	208.0	.6



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 3

Type	Quadrat Frequency '97
Rabbit	8
Elk	4
Deer	41
Cattle	3

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 3

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	8	-	-	-	-	-	10	-	-	-	200			10
Y	87	-	10	4	-	-	-	-	-	-	14	-	-	-	933			14
	91	-	3	1	-	-	-	2	-	-	5	-	1	-	400			6
	97	8	1	-	-	-	-	-	-	-	9	-	-	-	180			9
M	87	-	5	64	-	-	-	-	-	-	69	-	-	-	4600	14	18	69
	91	2	9	7	-	3	-	-	-	-	18	-	3	-	1400	19	23	21
	97	42	87	12	-	-	-	-	-	-	141	-	-	-	2840	15	28	142
D	87	-	-	17	-	-	-	-	-	-	14	-	-	3	1133			17
	91	3	21	20	1	6	3	-	-	-	32	-	10	12	3600			54
	97	45	86	8	-	-	-	-	-	-	94	-	2	43	2780			139
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	2720			136

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	15%	85%	03%	-19%
'91	52%	38%	32%	+ 7%
'97	60%	07%	16%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	6666	Dec:	17%
	'91	5400		67%
	'97	5800		48%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ceratoides lanata																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

Chrysothamnus viscidiflorus																		
M	87	-	13	1	-	-	-	-	-	-	14	-	-	-	933	6	7	14
	91	-	-	-	-	-	-	-	-	1	-	-	-	1	66	2	3	1
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	9	12	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	93%	07%	00%	-93%
'91	00%	100%	100%	+34%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	933	Dec:	-
	'91	66		-
	'97	100		-

Chrysothamnus viscidiflorus stenophyllus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	7	11	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	1	-	-	-	-	-	3	-	-	-	60	6	13	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	60		-

Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	1	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	0		-

Trend Study 24-4-97

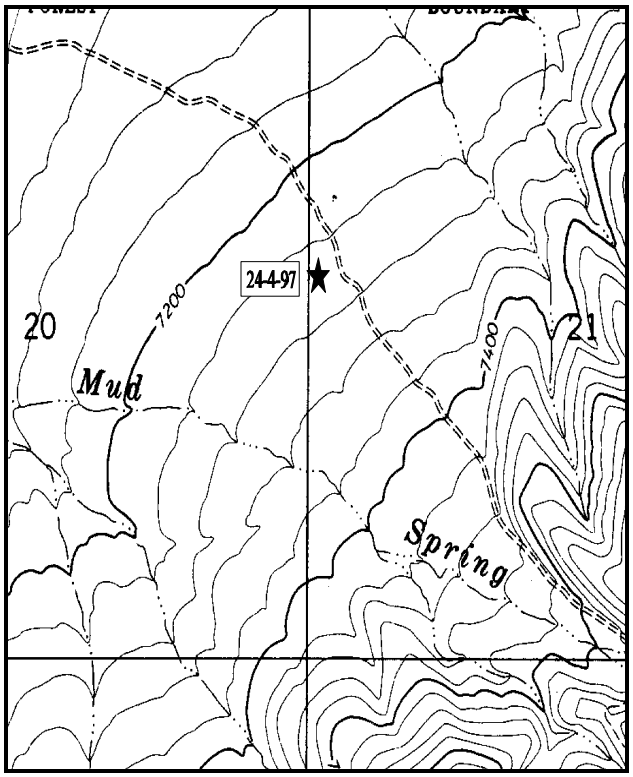
Study site name: Mud Spring Chaining . Range type: Chained, Seeded Pinyon-Juniper .

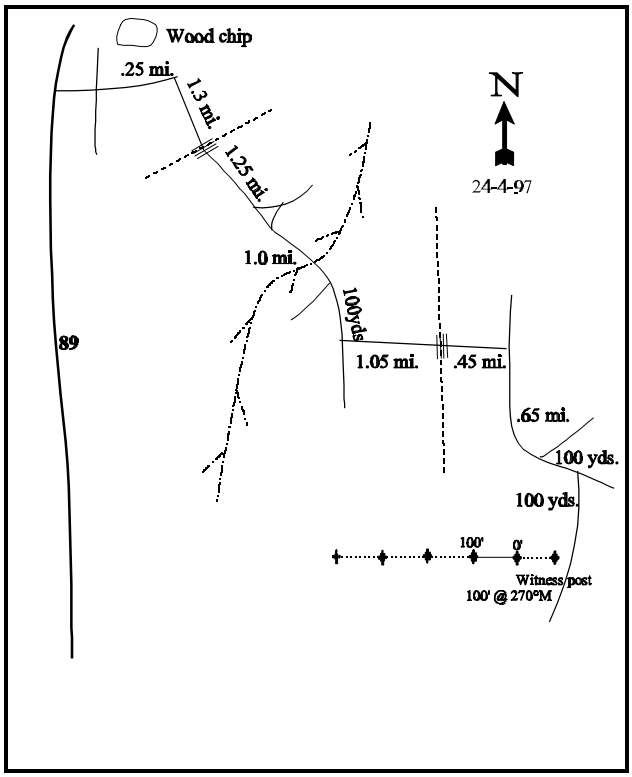
Compass bearing: frequency baseline 270 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

At the junction of HWY 89 and 400 south in Circleville go east for 0.5 miles. Turn right 200 feet after crossing a bridge. Continue for 0.55 miles to a four-way fork. Go straight through the fork for 0.4 miles to a canal and 5 forked roads. Take the second left road going off at 45° angle towards a woodchip operation. Continue on a road through a hay field for 0.25 miles and turn right. After 1.3 miles there will be a cattleguard and keep going for 1.25 mile to a fork. Stay right (straight) to another fork 1.0 mile away. Turn left at this fork for 100 yds. to another fork. At this fork turn left again. After 1.05 miles you will reach the Forest Service boundary (cattleguard). From here continue for 1.15 miles to a fork followed immediately by another. Stay right at both forks. The witness post is 600 yards from the last fork. The post is off the right side of the road. The 0-foot baseline stake has browse tag #7887.





Map Name: Mt. Dutton Diagrammatic Sketch

Township 31S , Range 3W , Section 21 UTM 4217823.617 N, 393836.392 E

DISCUSSION

Trend Study 24-4 (50-4)

The Mud Spring Chaining study is located in a chained pinyon-juniper woodland in the northwest portion of the herd unit. The site is located in the Mud Spring area at an elevation of 7,200 feet. This is a key area for deer during the winter and spring but deer pellet groups were not abundant with a quadrat frequency of only 8% in 1997. Some sign of livestock was also encountered in 1997. Escape and thermal cover is provided by a mature pinyon-juniper woodland that surrounds the chained area. The site slopes gradually (less than 6%) to the northwest.

The soil is relatively shallow and very rocky with an effective rooting depth (see methods) estimated at just under 13 inches in 1997. Soil texture is a sandy loam with a neutral pH (6.9). Rocks and pavement are common on the surface and in the profile. A considerable amount of organic matter has built up underneath the trees and shrubs. There was evidence of down-cutting in the numerous active gullies found over the chaining, but the well-drained soils and high rock cover minimize the adverse effect of runoff.

The key shrub species is mountain big sagebrush which accounts for 54% of the shrub cover at a density that has averaged about 1,000 plants/acre since 1987. Total sagebrush cover averaged just over 6% in 1997. It is light to moderately utilized, in good vigor with low decadence and adequate amounts of seedlings and young. Antelope bitterbrush is also present, although found in such low numbers (20 plants/acre) that it is not a significant component to the community.

Pinyon and juniper have become reestablished and/or released by the chaining, but still are found at low densities. Point-quarter data from 1987 estimated 67 pinyon and 200 juniper trees/acre. Pinyon nearly doubled in density by 1991 to 129 trees/acre while juniper densities declined to 108 trees/acre. Data from 1997 estimate 90 pinyon trees/acre and 127 juniper trees/acre. Average diameter of pinyon is three inches while that of juniper is 4.2 inches. Pinyon was mostly removed during the chaining, and the seedlings that were present at that time had grown to an average height of two feet by 1987. Both juniper and pinyon trees currently average around eight to 10 feet in height.

The most abundant grass is crested wheatgrass which accounts for 98% of the grass cover. No other seeded species was encountered on the study. Five other perennial grasses and one sedge are found on the site yet they occur rarely. Forbs are uncommon and currently produce only just over one-quarter of one percent cover.

1991 TREND ASSESSMENT

Percent rock, pavement, and bare ground cover all increased since 1987. Percent litter decreased during the same period. Vegetative basal cover stayed about the same. Erosion is currently evident on the site but severe only in the washes. Trend would be considered slightly down at this time. The key browse species, mountain big sagebrush, has increased it's population by 26%, while the increaser, broom snakeweed had decreased it's numbers by 68%. This is a good upward trend taking place. The sagebrush density is still quite low at 1,265 plants per acre, but this would be expected to increase through time. The most common grass is crested wheatgrass with a quadrat frequency of 86%. Forbs occur in very low numbers. The herbaceous understory appears to have a stable trend.

TREND ASSESSMENT
soil - slightly downward
browse - upward
herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil appears stable with similar amounts of bare ground and litter cover compared to 1991 estimates. Trend for mountain big sagebrush is also stable with a similar density, light to moderate use, good vigor and low decadence. Recruitment is good with a reproductive potential (percentage of seedlings to the population) of 17% and 27% of the population consisting of young plants. The herbaceous understory is totally dominated by crested wheatgrass which currently accounts for 96% of the herbaceous cover. It has remained stable since 1987 with a quadrat frequency ranging from 86% to 91%. Other grasses and forbs are rare. The herbaceous understory trend is stable with poor composition.

TREND ASSESSMENT
soil - stable
browse - stable
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 4

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Agropyron cristatum	257	249	267	88	86	91	11.16
G	Bouteloua gracilis	$_{b}$57	$_{a}$30	$_{a}$10	21	12	5	.05
G	Carex spp.	13	20	8	6	7	4	.02
G	Oryzopsis hymenoides	4	5	3	3	3	1	.03
G	Poa fendleriana	$_{b}$13	$_{a}$1	$_{a}$-	8	1	-	-
G	Sitanion hystrix	$_{b}$31	$_{b}$29	$_{a}$9	15	16	3	.07
G	Stipa comata	$_{b}$16	$_{ab}$10	$_{a}$2	8	4	1	.00
Total for Grasses		391	344	299	149	129	105	11.34
F	Arabis spp.	$_{b}$19	$_{a}$1	$_{a}$6	10	1	3	.01
F	Astragalus spp.	-	3	-	-	1	-	-
F	Cryptantha spp.	7	3	3	3	1	1	.01
F	Erigeron pumilus	$_{b}$19	$_{ab}$11	$_{a}$2	9	5	2	.01
F	Hymenopappus filifolius	11	23	23	6	9	10	.22
F	Machaeranthera canescens	-	1	2	-	1	1	.00
F	Penstemon pachyphyllus	$_{b}$9	$_{ab}$4	$_{a}$-	4	2	-	-
F	Phlox hoodii canescens	3	-	-	1	-	-	-
F	Tragopogon dubius	1	-	-	1	-	-	-
Total for Forbs		69	46	36	34	20	17	0.26

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 4

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	31	6.21
B	Eriogonum microthecum	1	.00
B	Gutierrezia sarothrae	11	.08
B	Juniperus osteosperma	5	.03
B	Opuntia spp.	2	.03
B	Pinus edulis	13	5.18
B	Purshia tridentata	1	-
B	Yucca spp.	1	.03
Total for Browse		65	11.57

CANOPY COVER --
Herd unit 24 , Study no: 4

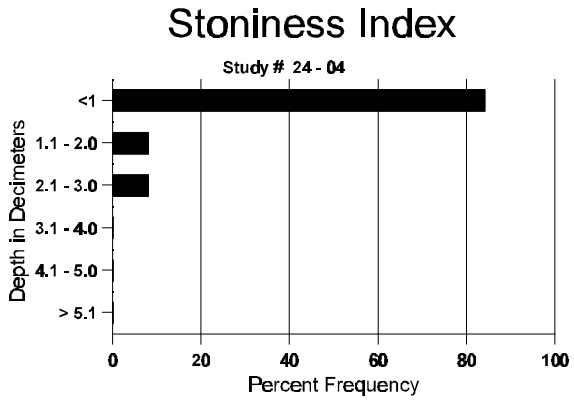
Species	Percent Cover '97
Juniperus osteosperma	2
Pinus edulis	4

BASIC COVER --
Herd unit 24 , Study no: 4

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	297	4.25	4.00	26.82
Rock	278	20.50	27.50	18.86
Pavement	282	4.25	6.75	13.48
Litter	382	53.75	41.50	37.68
Cryptogams	25	0	0	.06
Bare Ground	265	17.25	20.25	14.53

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 04

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.7	55.2 (16.0)	6.9	67.0	18.4	14.6	3.6	38.4	608.0	.5



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 4

Type	Quadrat Frequency '97
Rabbit	9
Deer	8
Cattle	3

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 4

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	91	6	-	-	1	-	-	-	-	-	6	-	1	-	233			7
	97	8	1	-	-	-	-	-	-	-	9	-	-	-	180			9
Y	87	2	23	-	-	-	-	-	-	-	25	-	-	-	833			25
	91	21	2	-	1	-	-	1	-	-	25	-	-	-	833			25
	97	11	3	-	-	-	-	-	-	-	14	-	-	-	280			14
M	87	1	2	-	-	-	-	-	-	-	3	-	-	-	100	43	43	3
	91	7	3	-	1	-	-	-	-	-	11	-	-	-	366	11	13	11
	97	24	9	1	-	-	-	-	-	-	34	-	-	-	680	22	37	34
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	2	-	-	-	-	-	-	-	2	-	-	-	66			2
	97	4	-	-	-	-	-	-	-	-	-	-	-	4	80			4
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	89%	00%	00%	+26%
'91	18%	00%	00%	-18%
'97	23%	02%	08%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	933	Dec:	0%
	'91	1265		5%
	'97	1040		8%

Eriogonum microthecum																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
Y	87	13	-	-	-	-	-	-	-	-	13	-	-	-	433			13
	91	9	-	-	-	-	-	-	-	-	9	-	-	-	300			9
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	83	1	-	-	-	-	-	-	-	84	-	-	-	2800	7	7	84
	91	19	-	-	-	-	-	-	-	-	19	-	-	-	633	4	4	19
	97	11	-	-	-	-	-	-	-	-	11	-	-	-	220	8	12	11
D	87	2	-	-	-	-	-	-	-	-	-	-	2	-	66			2
	91	4	-	-	-	-	-	-	-	-	3	-	-	1	133			4
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	01%	00%	02%	-68%
'91	00%	00%	03%	-76%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	3299	Dec:	2%
	'91	1066		12%
	'97	260		8%

Juniperus osteosperma																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	91	2	1	-	-	-	-	-	-	-	3	-	-	-	100			3
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66	79	39	2
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	33	108	33	1
	97	2	-	-	2	-	-	-	-	-	3	-	1	-	80	-	-	4
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-33%
'91	50%	00%	00%	-25%
'97	00%	00%	20%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	199	Dec:	-
	'91	133		-
	'97	100		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	8	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Appeared
'91	00%	00%	00%	+45%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	33		-
	'97	60		-

Pinus edulis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	5	-	-	4	-	-	2	-	-	11	-	-	-	220	-	-	11
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	00%	00%	+88%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	33	Dec:	-
	'91	33		-
	'97	280		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	23	52	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

Yucca spp.																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	7	15	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

Trend Study 24-5-97

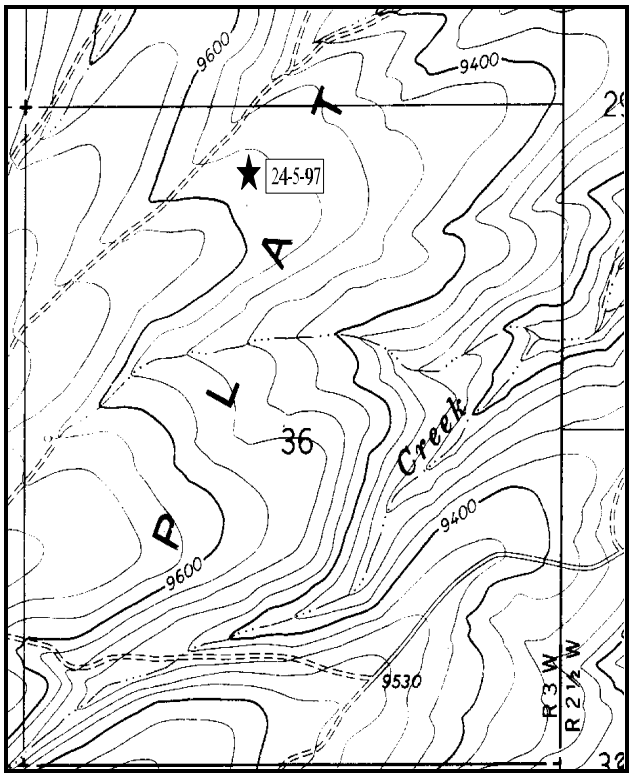
Study site name: Suicide . Range type: Mountain Big Sage/Grass-Forb.

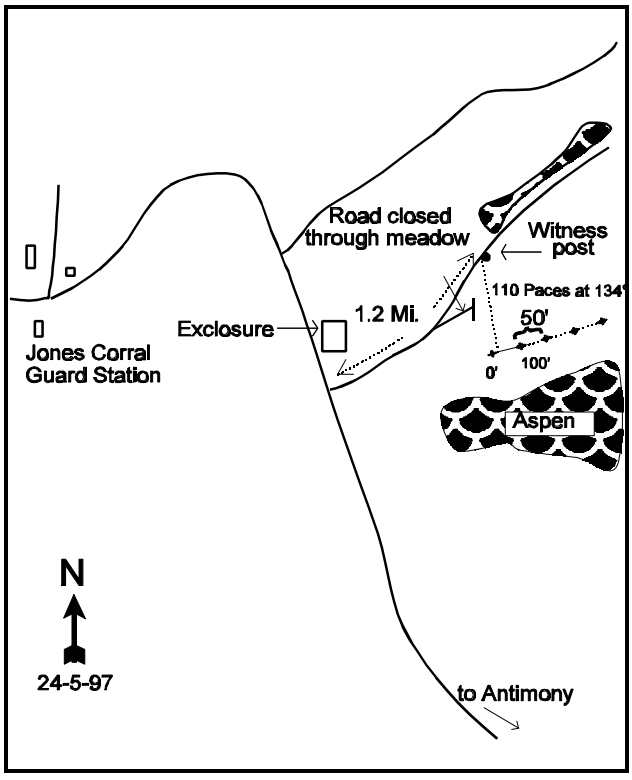
Compass bearing: frequency baseline 65 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

Take the Mt. Dutton road (#125), either south from Antimony or north from Cottonwood AS, towards Jones Corral Guard Station. Turn west off of #125 towards the guard station. Proceed 1.2 miles to an intersection by an exclosure. Turn right and go 1.2 miles along a road above a meadow area (the lower road is closed by dozer piles). There is a witness post on the right side of the road to mark the study area. From this witness post, walk approximately 110 paces southeast across the stream bottom and up the hillside to the short fencepost tagged #7166. The transect runs northeast (65°) from here.





Map Name: Mt. Dutton Diagrammatic Sketch

Township 31S , Range 3W , Section 36 UTM 4215335.120 N, 399681.269 E

DISCUSSION

Trend Study 24-5 (50-5)

The Suicide study site is located at an elevation of 9,500 feet and approximately one mile northeast of the Jones Corral Guard Station. The vegetation type is mountain big sagebrush/forb-grass, which is adjacent to small and large continuous stands of aspen. The site is on a moderate slope of 25% with a north-northwest aspect. This area is representative of many of the sagebrush-grass/aspen areas in the vicinity of Jones Corral. A considerable amount of forage is available adjacent to the aspen cover. It is a key use area for elk during the summer and fall. The area is also utilized by cattle with several stock ponds in the immediate area. Pellet group data from 1997 estimate 16 deer, 23 elk and 29 cow use days/acre. Local community pressure is limited to the roads, but is probably higher within the vicinity of the guard station than elsewhere on the mountain.

The soil is a dark brown loam with a moderately acidic pH (6.2). The soil contains a high level of organic matter (5.7%), the highest level on the unit. There is an abundance of rocks of various sizes on the surface and in the profile. Effective rooting depth (see methods) is estimated at nearly 14 inches. The vegetative cover is continuous and intact and serves to limit erosion. Litter buildup has occurred, which also helps slow down erosion. Good vegetation and litter cover, coupled with fairly well drained soils, has allowed this area to maintain a stable to improving soil trend. The Forest Service has implemented a road maintenance plan in this area. Several unnecessary roads have been closed in the drainage and revegetated in an effort to limit soil erosion point sources.

The herbaceous vegetation is dominated by a mountain big sagebrush overstory which currently produces nearly 20% cover, or 60% of the browse cover. Sagebrush density is fairly high and increasing with 4,532 plants/acre estimated in 1987, 6,932 plants/acre in 1991 and 16,680 by 1997. Density of mature plants remained similar at 3,020 plants/acre in 1997. The decadency rate has decreased from 43% in 1987 to 15% in 1991, and to only 2% in 1997. Vigor has improved and utilization has declined from moderate to only light use. Some of the change in density may be due to the larger sample used in 1997, but it is obvious that the sagebrush population has steadily increased since 1987. The overabundance of sagebrush seedlings and young is likely caused by the removal of the competitive herbaceous understory by livestock combined with optimum precipitation conditions for seedling establishment. Right now, 79% of the population is contributed by the young age class. Obviously, many of these seedlings and young sagebrush will not survive, but any future increase in the shrub canopy cover will only further reduce the herbaceous understory which is important for wildlife as well as livestock.

Snowberry is the second most abundant shrub and has also increased in density with 1,799 plants/acre reported in 1987 increasing to 6,200 plants/acre in 1991. The much larger sample size used in 1997 estimated a lower density of 2,400 plants/acre, 80% of which are mature plants. Utilization was moderate to heavy in 1987, light to moderate in 1991, and mostly light in 1997. Vigor has been good over the years and percent decadence low. The larger sample used in 1997 also picked up some heavily used bitterbrush. Density is estimated at 480 plants/acre, 71% of which are mature. The increaser, stickyleaf low rabbitbrush, has remained at a similar density of around 1,200 plants/acre. Currently, the population is mostly mature and does not appear to be increasing.

The understory is rich in species diversity and abundance. Eleven grasses and 26 forbs were encountered on the site in 1997. Grasses combine to produce almost 12% cover, while forbs add another 17% cover. The key grasses include: a Carex, Letterman needlegrass, and a combination of Sandberg and mutton bluegrass. These grasses were all classified as Sandberg bluegrass in 1987 and 1991. Low growing increaser forbs including dandelion, Eaton fleabane, rose pussytoes, and cinquefoil are numerous, but silvery lupine is the dominate forb.

1991 TREND ASSESSMENT

Soil trend is slightly downward because of increase in bare ground (it doubled), rock, and pavement, with an accompanying decline in litter cover. Both key browse species increased. Of importance was the increase in mountain big sagebrush (35%), decrease in decadency (43% down to 15%), and reproductive potential increasing (<1% up to 19%). Heavy hedging has increased slightly, yet vigor has also improved. Trend for browse is up. Trend for herbaceous understory is also up slightly with most grasses and forbs increasing in nested frequency values.

TREND ASSESSMENT
soil - slightly downward
browse - up
herbaceous understory - slightly upward

1997 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1991. Trend for the key browse species, mountain big sagebrush, is up with a similar density of mature plants compared to 1991. Also, the reproductive potential dramatically increased from 19% to 62% coupled with an increase in the proportion of young plants from 37% to 79%. In addition, utilization is lighter, vigor improved, and percent decadency is down from 15% to only 2%. Any increase in sagebrush density or cover will come at the expense of grasses and forbs. Other preferred browse species, bitterbrush, and snowberry appear to have stable populations. Since this site is used in the spring and summer the herbaceous understory is the most important aspect of this site. Trend for grasses and forbs is down with declining sum of nested frequencies for both. The only grasses which increased in nested frequency are prairie Junegrass and Letterman needlegrass. Most of the forbs also show a decrease in nested frequency. Composition is also poor with many of the forbs consisting of weedy increasers.

TREND ASSESSMENT
soil - stable
browse - up
herbaceous understory - down

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 5

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Agropyron trachycaulum	$_{b}$89	$_{b}$53	$_{a}$28	41	27	13	.29
G	Bouteloua gracilis	-	1	-	-	1	-	-
G	Bromus anomalus	$_{c}$193	$_{b}$112	$_{a}$8	76	49	3	.05
G	Carex obtusata	$_{a}$124	$_{b}$167	$_{ab}$144	52	61	51	2.95
G	Elymus spp.	-	1	-	-	1	-	-
G	Festuca ovina	$_{b}$158	$_{c}$201	$_{a}$65	66	76	25	.61
G	Koeleria cristata	$_{a}$46	$_{b}$108	$_{b}$115	23	40	43	1.30
G	Muhlenbergia spp.	2	3	-	1	3	-	-
G	Poa fendleriana	$_{a}$-	$_{a}$-	$_{b}$127	-	-	51	1.87

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Poa pratensis	-	-	3	-	-	1	.03
G	Poa secunda	$_{b}$229	$_{b}$230	$_{a}$86	80	82	30	1.24
G	Sitanion hystrix	$_{b}$108	$_{b}$137	$_{a}$51	47	62	25	.26
G	Stipa comata	$_{b}$101	$_{b}$119	$_{a}$47	37	46	18	.78
G	Stipa lettermani	$_{a}$39	$_{a}$22	$_{b}$86	13	9	32	2.19
Total for Grasses		1089	1154	760	436	457	292	11.60
F	Achillea millefolium	$_{b}$50	$_{b}$52	$_{a}$6	18	21	2	.18
F	Agoseris glauca	$_{a}$-	$_{c}$34	$_{b}$15	-	18	7	.03
F	Antennaria rosea	$_{b}$183	$_{ab}$70	$_{a}$155	69	64	60	4.53
F	Androsace septentrionalis (a)	-	-	6	-	-	4	.02
F	Artemisia dracunculus	-	-	3	-	-	1	.03
F	Arabis pulchra	$_{b}$61	$_{a}$9	$_{a}$5	26	3	2	.01
F	Astragalus argophyllus	$_{ab}$2	$_{b}$8	$_{a}$-	1	5	-	-
F	Astragalus miser	5	3	1	3	1	1	.00
F	Aster spp.	-	-	3	-	-	1	.00
F	Castilleja linariaefolia	-	-	2	-	-	2	.01
F	Calochortus nuttallii	-	-	1	-	-	1	.00
F	Collomia linearis (a)	-	-	9	-	-	3	.01
F	Comandra pallida	$_{b}$8	$_{a}$-	$_{a}$-	4	-	-	-
F	Crepis acuminata	3	3	-	1	1	-	-
F	Cruciferae	-	14	-	-	7	-	-
F	Cryptogramma	-	3	-	-	1	-	-
F	Cymopterus lemmonii	$_{b}$10	$_{ab}$6	$_{a}$-	5	3	-	-
F	Epilobium paniculatum (a)	-	-	10	-	-	4	.04
F	Erigeron eatonii	$_{a}$72	$_{b}$149	$_{a}$104	37	63	44	.94
F	Erigeron flagellaris	$_{b}$110	$_{b}$83	$_{a}$43	46	36	20	.64
F	Eriogonum racemosum	$_{a}$-	$_{a}$-	$_{b}$9	-	-	5	.05
F	Eriogonum umbellatum	$_{a}$1	$_{b}$13	$_{a}$3	1	6	1	.03
F	Euphorbia spp.	-	-	7	-	-	4	.04
F	Frasera speciosa	1	-	-	1	-	-	-
F	Lupinus argenteus	$_{a}$76	$_{b}$105	$_{a}$70	40	51	33	4.66
F	Lychnis drummondii	-	4	4	-	2	2	.01
F	Penstemon spp.	$_{a}$4	$_{b}$26	$_{a}$-	2	13	-	-
F	Phlox longifolia	$_{a}$18	$_{b}$43	$_{ab}$32	6	19	14	.09
F	Potentilla anersina	-	-	3	-	-	1	.03

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
F	Potentilla diversifolia	55	53	67	25	23	27	1.89
F	Polygonum douglasii (a)	-	-	126	-	-	48	.54
F	Ranunculus inamoenus	$_{b}$15	$_{a}$-	$_{a}$-	6	-	-	-
F	Senecio multilobatus	-	-	2	-	-	2	.01
F	Taraxacum officinale	$_{b}$321	$_{b}$304	$_{a}$187	97	96	68	3.32
F	Thermopsis montana	14	3	4	5	1	2	.01
F	Tragopogon dubius	$_{c}$32	$_{b}$10	$_{a}$-	20	7	-	-
F	Trifolium nanum	$_{b}$9	$_{b}$15	$_{a}$-	4	6	-	-
F	Unknown forb-perennial	-	4	-	-	2	-	-
Total for Forbs		1050	1114	877	417	449	359	17.19

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 5

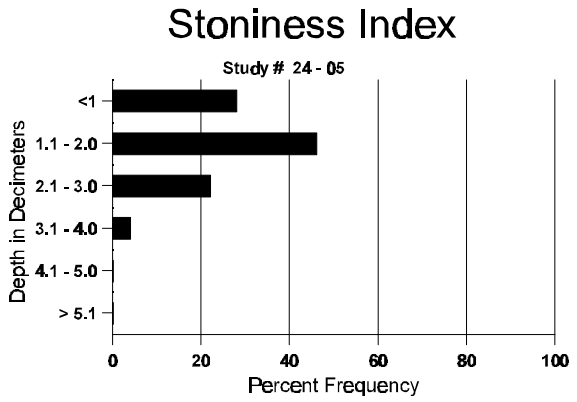
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	82	19.67
B	Chrysothamnus nauseosus albicaulis	12	.21
B	Chrysothamnus viscidiflorus viscidiflorus	38	1.97
B	Juniperus communis	6	-
B	Populus tremuloides	2	-
B	Purshia tridentata	14	3.26
B	Ribes spp.	2	.15
B	Rosa woodsii	2	-
B	Symphoricarpos oreophilus	56	7.59
B	Tetradymia canescens	2	-
Total for Browse		216	32.87

BASIC COVER --
Herd unit 24 , Study no: 5

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	366	14.00	20.25	56.58
Rock	199	7.25	9.75	6.03
Pavement	263	1.75	6.25	7.90
Litter	391	70.25	49.00	45.49
Cryptogams	28	1.00	2.25	.44
Bare Ground	263	5.75	12.50	15.41

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 05

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
13.9	44.2 (16.2)	6.2	48.7	40.7	10.6	5.7	40.2	358.4	.6



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 5

Type	Quadrat Frequency '97
Rabbit	2
Elk	14
Deer	27
Cattle	6

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 5

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier utahensis																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	93	78	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		-
	'91	0		-
	'97	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	9	-	-	11	-	-	-	-	-	20	-	-	-	1333			20
	97	510	-	-	14	-	-	-	-	-	524	-	-	-	10480			524
Y	87	13	10	-	-	-	-	-	-	-	23	-	-	-	1533			23
	91	12	11	1	7	-	-	7	-	-	38	-	-	-	2533			38
	97	642	-	-	15	-	-	3	-	-	660	-	-	-	13200			660
M	87	5	11	-	-	-	-	-	-	-	10	-	6	-	1066	17	17	16
	91	28	16	3	-	2	-	1	-	-	45	-	5	-	3333	17	17	50
	97	120	26	2	3	-	-	-	-	-	151	-	-	-	3020	24	33	151
D	87	17	11	1	-	-	-	-	-	-	24	-	5	-	1933			29
	91	11	4	1	-	-	-	-	-	-	10	-	1	5	1066			16
	97	19	1	-	3	-	-	-	-	-	14	-	-	9	460			23
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	1160			58

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	47%	01%	16%	+35%
'91	32%	05%	11%	+58%
'97	03%	.23%	01%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	4532		43%
	'91	6932		15%
	'97	16680		3%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus albicaulis																		
Y	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	91	12	4	-	1	-	-	1	-	-	18	-	-	-	1200			18
	97	14	3	-	-	-	-	-	-	-	13	-	-	-	340			17
M	87	12	-	-	-	-	-	-	-	-	12	-	-	-	800	9	6	12
	91	2	4	6	1	-	-	-	-	-	13	-	-	-	866	10	14	13
	97	3	-	-	4	-	-	-	-	-	7	-	-	-	140	9	7	7
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	5	5	-	-	-	-	-	-	9	-	-	1	666			10
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+49%
'91	32%	27%	02%	-82%
'97	13%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	1400	Dec:		0%
'91	2732			24%
'97	480			0%

Chrysothamnus viscidiflorus viscidiflorus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	2	1	-	1	-	-	2	-	-	6	-	-	-	400			6
	97	6	-	-	-	-	-	-	-	-	5	-	-	-	120			6
M	87	13	-	-	-	-	-	-	-	-	13	-	-	-	866	11	7	13
	91	6	-	-	5	-	-	1	-	-	12	-	-	-	800	10	10	12
	97	48	-	1	7	-	-	-	-	-	55	-	-	-	1120	12	14	56
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	3	4	1	-	-	-	-	-	-	4	-	1	3	533			8
	97	-	-	1	-	-	-	-	-	-	-	-	-	-	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+35%
'91	19%	04%	15%	-27%
'97	00%	03%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	1132	Dec:		0%
'91	1733			31%
'97	1260			2%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus communis																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	7	-	-	4	-	-	-	-	-	11	-	-	-	220	9	3	11

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	380		-

Populus tremuloides																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	7	-	-	-	-	-	-	-	-	7	-	-	-	140			7
Y	87	-	2	-	-	-	-	-	-	-	1	-	1	-	133			2
	91	-	1	1	1	1	-	-	-	-	2	-	2	-	266			4
	97	-	1	-	2	-	-	-	-	-	3	-	-	-	60			3
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	1	-	-	-	-	-	-	-	-	-	1	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	100%	00%	50%	+60%
'91	40%	40%	60%	-82%
'97	33%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	133	Dec:	0%
	'91	332		20%
	'97	60		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20			1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	3	1	1	-	-	1	-	-	7	-	-	-	140			7
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	8	8	1	-	-	17	-	-	-	340	27	48	17

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	46%	38%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	480		-

Ribes spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	40	50	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	50%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	40		-

Rosa woodsii																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	40		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	2	2	4	-	-	-	-	-	-	8	-	-	-	533			8
	91	17	5	-	4	1	-	3	-	-	30	-	-	-	2000			30
	97	12	-	-	1	-	-	-	-	-	13	-	-	-	260			13
M	87	2	7	8	-	-	-	-	-	-	17	-	-	-	1133	14	13	17
	91	14	22	8	7	-	1	5	-	-	57	-	-	-	3800	15	19	57
	97	73	-	2	15	3	-	3	-	-	96	-	-	-	1920	16	32	96
D	87	-	1	1	-	-	-	-	-	-	2	-	-	-	133			2
	91	2	-	-	3	1	-	-	-	-	4	-	1	1	400			6
	97	4	-	1	6	-	-	-	-	-	10	-	-	1	220			11

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	37%	48%	00%	+71%
'91	31%	10%	02%	-61%
'97	03%	03%	.83%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	1799	Dec:		7%
'91	6200			6%
'97	2400			9%

Tetradymia canescens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	1	-	-	1	-	-	-	20	11	11	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'91	0			-
'97	80			-

Trend Study 24-6-97

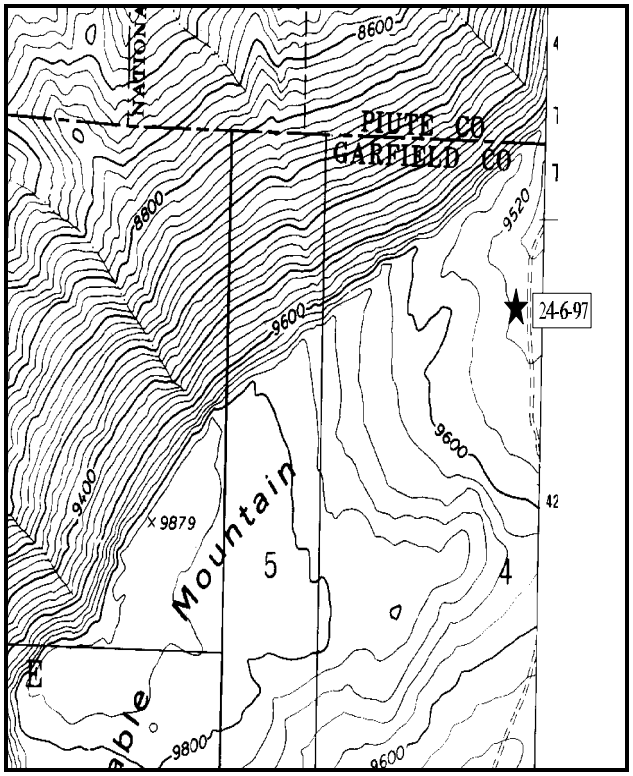
Study site name: Table Mountain . Range type: Burn .

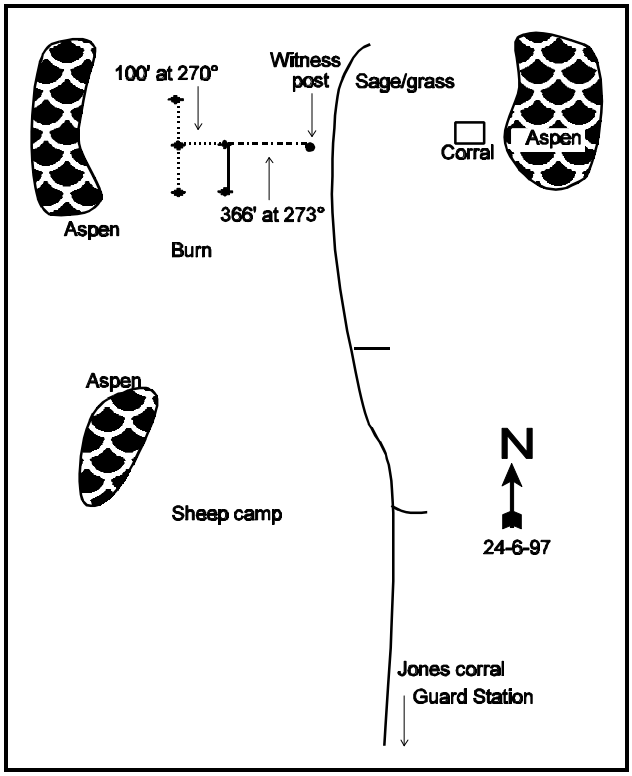
Compass bearing: frequency baseline 163 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Jones Corral Guard Station, head north towards Table Mountain. Go 0.35 miles to a fork, stay right and continue 0.8 miles to a fork. Stay right and continue 1.3 miles to a fork and cattleguard. Keep right and go 0.1 miles to another fork. Bear left and continue 2.3 miles to a fork. Stay right and continue north for 1.4 miles to a burned flat surrounded by aspens. Look for a 4' tall fencepost on the left side of the road. This witness post marks the location of the study, which starts about 120 yards west of the road. The 0-foot baseline stake is marked by a red browse tag #9004.





Map Name: Junction Diagrammatic Sketch

Township 31S , Range 2 1/2W , Section 4 UTM 4221463.607 N, 401219.422 E

DISCUSSION

Trend Study 24-6 (50-6)

The Table Mountain study is located on a prescribed burn on Table Mountain at an elevation of 9,500 feet. The terrain slopes gradually to the southeast with a slope of 7%. This is a key area for elk and deer during the summer. The site once supported an extensive stand of mountain big sagebrush which is reestablishing itself on the site. A variety of grasses now dominate and provide good ground cover. Adjacent stands of aspen provide escape cover for big game that use this area. Pellet group data from 1997 estimate 53 deer, 61 elk, and 10 cow use days/acre. This is a sheep allotment which has been grazed by 720 sheep from July 1st to September 30th . This unit has been in non-use status since 1995.

The soils are deep, rocky, and derived from volcanic parent material. The soil is well drained and not compacted with an effective rooting depth (see methods) estimated at almost 15 inches. It has a brown-orange color, has a loam texture and a moderately acidic pH (6.1). The vegetation is continuous and intact, leaving little bare ground unprotected. Erosion is not a problem on the site.

Oregon grape and snowberry sprouted after the fire and they dominated the browse composition in 1987 and 1991. Mountain big sagebrush was sparsely distributed over the burn, at a density of only 33 plants/acre in 1987 and 66 in 1991. The much larger sample used in 1997 estimated 1,640 sagebrush plants/acre, 61% of which are young plants. Density of snowberry declined 53%, primarily due to the increased sample size since there are few dead plants in the population. The majority of the snowberry were heavily hedged (95%) in 1987, but use has steadily declined since with 20% heavily hedged in 1991 and only 5% in 1997. Vigor is normal and percent decadence low at 11%. This same trend of declining heavy use is seen in sagebrush. Current use is mostly light.

Woods rose was not sampled on the site in 1987 or 1991, but it was present in the area and heavily hedged. Sheep that used this allotment then appear to have utilized a significant portion of the forage produced by these two shrubs. The larger sample utilized in 1997 picked up some Woods rose (220 plants/acre), however none appear to have been utilized this season.

The herbaceous understory dominates the site with 12 grass species providing 22% cover and 20 species of forbs producing an additional 16% cover. The most abundant grass is Letterman needlegrass which provides nearly half (48%) of the grass cover. Bluebunch wheatgrass, mutton bluegrass, and needle-and-thread are also common. The forb composition is dominated by silvery lupine which produces 53% of the forb cover. The only other forbs which provide more than 1% cover include a phlox and dandelion. Some misidentification between the *Poa* species (*Poa fendleriana, Poa pratensis* and *Poa secunda*) appears to have occurred in 1987 causing large changes in nested and quadrat frequencies.

1991 TREND ASSESSMENT

Vegetative basal cover has increased to almost 14% with bare ground going down to about 9%. Percent rock decreased slightly and percent litter increased slightly. Soil trend is improving. For the browse, normally the key species would be mountain big sagebrush, but with only 66 plants/acre it cannot be counted on very much. Snowberry on this site is heavily used. It's density has decreased by 5% with a slight increase in percent decadency. Trend is improving but still poor since the prescribed burn. The trend for the herbaceous understory is, for the most part improving. However, most of the species for both grasses and forbs are increaser's in habit, which is not an ideal situation. Other species would be more preferred.

TREND ASSESSMENT
soil - slightly upward
browse - slightly upward, but still poor composition with low density for mountain big sagebrush
herbaceous understory - slightly upward, but poor composition with too many increaser species

1997 TREND ASSESSMENT

Trend for soil is stable with excellent protective ground cover. Trend for browse is up for mountain big sagebrush with a 96% increase in density. Reproductive potential and the proportion of young plants in the population have both increased dramatically since 1991. Utilization is mostly light, vigor good with few decadent plants. Snowberry has declined in density by 53%, however this appears to be due more to the larger sample size used in 1997 which better estimates shrub densities. The snowberry appears to have a stable, lightly utilized population. Trend for the herbaceous understory is stable even though there was a decline in the sum of nested frequency for both grasses and forbs. Looking at the photo point comparisons between years, it appears that the decline in nested frequency of herbaceous species is a natural thinning process after a flush of growth following the burn. Grasses and forbs are very abundant and produce 37% cover on the site and browse cover, for all species, is only 9%.

TREND ASSESSMENT
soil - stable
browse - up for sagebrush
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 6

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'87	'91	'97	'87	'91	'97	'97
G	Agropyron spicatum	96	90	103	41	36	41	3.33
G	Agropyron trachycaulum	$_{b}$64	$_{b}$52	$_{a}$16	27	20	7	.18
G	Bromus anomalus	$_{ab}$14	$_{b}$29	$_{a}$3	8	13	3	.02
G	Carex spp.	17	26	33	9	10	11	.56
G	Festuca ovina	$_{b}$155	$_{a}$8	$_{a}$17	60	5	6	.22
G	Koeleria cristata	$_{a}$5	$_{b}$112	$_{a}$27	3	46	13	.24
G	Poa fendleriana	$_{a}$60	$_{b}$148	$_{a}$86	26	65	41	1.69
G	Poa pratensis	$_{a}$7	$_{b}$91	$_{a}$4	2	35	2	.06
G	Poa secunda	$_{b}$146	$_{a}$8	$_{a}$-	58	3	-	-
G	Sitanion hystrix	55	54	46	24	23	22	.95
G	Stipa columbiana	$_{a}$-	$_{a}$-	$_{b}$15	-	-	7	.78
G	Stipa comata	$_{a}$5	$_{b}$77	$_{b}$91	3	32	38	2.86
G	Stipa lettermani	$_{a}$163	$_{b}$266	$_{a}$178	61	91	55	9.94
Total for Grasses		787	961	619	322	379	246	20.88
F	Achillea millefolium	7	6	3	3	2	1	.03
F	Agoseris glauca	$_{a}$-	$_{a}$1	$_{b}$39	-	1	18	.09

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
F	Antennaria rosea	2	3	-	1	1	-	-
F	Arabis pulchra	$_{b}$166	$_{a}$1	$_{a}$1	69	1	1	.00
F	Astragalus convallarius	$_{a}$-	$_{c}$48	$_{b}$23	-	26	13	.21
F	Astragalus spp.	-	-	1	-	-	1	.00
F	Calochortus nuttallii	-	-	4	-	-	2	.01
F	Chenopodium album (a)	-	-	14	-	-	8	.04
F	Crepis acuminata	-	-	5	-	-	2	.06
F	Erigeron eatonii	$_{a}$-	$_{b}$15	$_{a}$6	-	9	2	.03
F	Eriogonum flavum	-	6	-	-	2	-	-
F	Eriogonum racemosum	5	10	13	3	4	6	.11
F	Lupinus argenteus	97	95	105	47	55	53	8.69
F	Lychnis drummondii	$_{a}$-	$_{b}$86	$_{a}$-	-	42	-	-
F	Lygodesmia spp.	-	-	4	-	-	2	.01
F	Penstemon spp.	$_{b}$107	$_{a}$21	$_{a}$7	43	9	6	.06
F	Phlox pulvinata	$_{b}$145	$_{b}$156	$_{a}$65	50	54	21	4.34
F	Potentilla diversifolia	$_{a}$-	$_{a}$4	$_{b}$12	-	1	7	.06
F	Potentilla spp.	6	3	6	3	2	3	.06
F	Senecio multilobatus	$_{ab}$8	$_{a}$-	$_{b}$16	3	-	7	.06
F	Taraxacum officinale	$_{c}$303	$_{b}$228	$_{a}$139	97	88	58	2.26
F	Thermopsis montana	-	-	2	-	-	1	.03
F	Tragopogon dubius	6	6	9	3	3	4	.07
F	Unknown forb-perennial	7	-	-	3	-	-	-
Total for Forbs		859	689	474	325	300	216	16.27

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 6

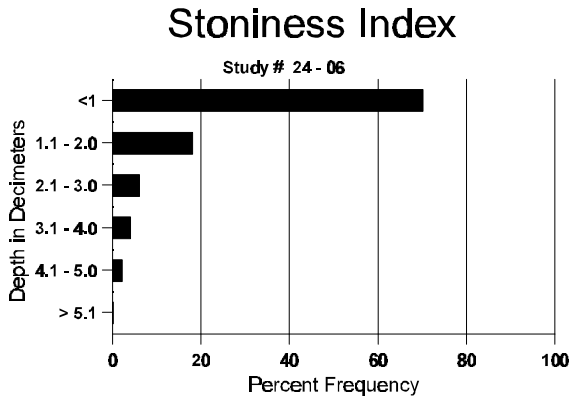
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata vaseyana	38	3.08
B	Chrysothamnus viscidiflorus viscidiflorus	1	-
B	Mahonia repens	11	.34
B	Ribes cereum inebrians	2	.15
B	Rosa woodsii	2	.03
B	Symphoricarpos oreophilus	43	5.71
Total for Browse		97	9.31

BASIC COVER --
Herd unit 24 , Study no: 6

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	367	11.75	13.50	52.29
Rock	275	7.75	6.25	7.28
Pavement	311	19.75	19.75	10.85
Litter	388	48.50	52.00	33.23
Cryptogams	30	0	0	.39
Bare Ground	169	12.25	8.50	5.76

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 06

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.8	47.2 (16.3)	6.1	38.4	35.1	26.6	5.0	47.1	454.4	.6



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 6

Type	Quadrat Frequency '97
Rabbit	4
Elk	15
Deer	18
Cattle	2

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 6

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	97	16	-	-	22	-	-	-	-	-	38	-	-	-	760			38
Y	87	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	44	-	-	6	-	-	-	-	-	50	-	-	-	1000			50
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33	10	14	1
	97	25	5	-	1	-	-	-	-	-	28	3	-	-	620	22	38	31
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	280			14

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	100%	00%	00%	+50%
'91	50%	00%	00%	+96%
'97	06%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	33	Dec:	0%
	'91	66		0%
	'97	1640		1%

Chrysothamnus viscidiflorus																		
D	87	-	-	1	-	-	-	-	-	-	-	-	-	1	33			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	100%	100%	Died out
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	33	Dec:	100%
	'91	0		0%
	'97	0		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	1	-	-	1	-	-	-	2	-	-	-	66	6	6	2
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20	13	14	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Appeared
'91	00%	100%	00%	-70%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	66		-
	'97	20		-

Mahonia repens																		
S	87	51	-	-	-	-	-	-	-	-	51	-	-	-	1700			51
	91	4	-	-	-	-	-	-	-	-	4	-	-	-	133			4
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	79	2	-	-	-	-	-	-	-	81	-	-	-	2700			81
	91	129	1	-	11	-	-	2	-	-	134	9	-	-	4766			143
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	87	131	-	-	-	-	-	-	-	-	131	-	-	-	4366	4	4	131
	91	185	8	4	20	2	-	2	-	-	200	21	-	-	7366	3	3	221
	97	84	-	-	8	-	-	-	-	-	92	-	-	-	1840	4	6	92
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	.94%	00%	00%	+42%
'91	03%	01%	00%	-84%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	7066	Dec:	0%
	'91	12198		1%
	'97	1940		0%

Pseudotsuga menziesii																		
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Ribes spp.																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	42	46	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	0		-

Ribes cereum inebrians																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	1	-	-	-	-	1	-	-	2	-	-	-	66	18	19	2
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	42	60	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Appeared
'91	50%	00%	00%	-39%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	66		-
	'97	40		-

Rosa woodsii																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120	8	9	6

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	220		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	87	-	6	2	-	-	-	-	-	-	8	-	-	-	266			8
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	1	-	-	-	-	-	2	-	-	-	40			2
Y	87	-	4	35	-	-	-	-	-	-	29	-	-	10	1300			39
	91	6	12	1	-	-	-	-	-	-	17	-	2	-	633			19
	97	4	-	-	2	-	-	-	-	-	6	-	-	-	120			6
M	87	-	-	46	-	-	-	-	-	-	42	-	-	4	1533	18	20	46
	91	5	21	14	6	8	-	-	-	-	54	-	-	-	1800	14	24	54
	97	36	6	2	3	2	1	-	-	-	49	1	-	-	1000	17	36	50
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	4	1	2	-	-	-	-	-	7	-	1	-	266			8
	97	5	1	-	1	-	-	-	-	-	5	-	-	2	140			7
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	05%	95%	16%	- 5%
'91	56%	20%	04%	-53%
'97	14%	05%	03%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	2833	Dec:	0%
	'91	2699		10%
	'97	1260		11%

Trend Study 24-7-97

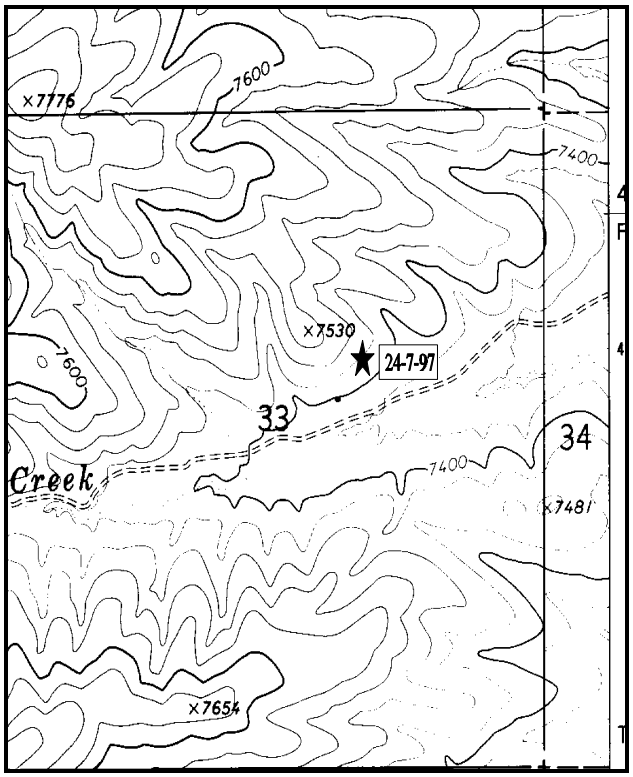
Study site name: Cow Creek . Range type: Chained, Railed-Shrubland .

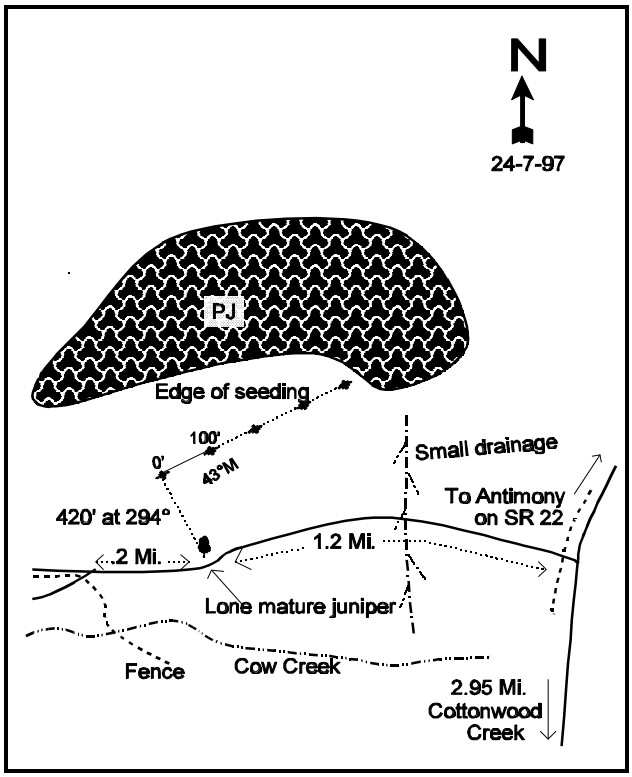
Compass bearing: frequency baseline 43 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the Cottonwood Creek turnoff on SR22 south of Antimony, proceed north on the highway 2.95 miles to a gate by Cow Creek. Turn west and drive through the seeded pasture up Cow Creek for 1.2 miles to a lone mature juniper right by the road. If you go too far (0.2 more miles) you will come to a fork by a fence. Stop by the lone Juniper and walk up the hill about 140 yards bearing 294 degrees to the start of the baseline a short fencepost with browse tag #9002. The transect runs east-northeast along the top edge of the seeding.





Map Name: Cow Creek Diagrammatic Sketch

Township 32S , Range 2W , Section 33 UTM 4203923.054 N, 411418.356 E

DISCUSSION

Trend Study 24-7 (50-7)

The Cow Creek study site is located on School Trust land in the mouth of Cow Creek at an elevation of 7,500 feet. This is a sagebrush-grass site that was disked and drill seeded prior to study establishment in 1987. It is a key area for elk in the spring and also for deer during the winter and spring. Antelope probably use this area year-round. Pellet group data from 1997 estimate seven deer, 63 elk and 27 cow use days/acre. Sheep sign was also noted in 1997. Wyoming big sagebrush occurs on the foothill slopes and basin big sagebrush is found on the deeper soils of the drainage bottoms. The treatment was more effective on the Wyoming big sagebrush than the Basin big sagebrush. The Basin big sagebrush that was not killed has regrown with vigorous vegetative growth and seed stalk production. The site is located on a 20-25% slope that has a southeast exposure.

The soil at the study site is moderately deep and rocky with an estimated effective rooting depth (see methods) of almost 18 inches. Texture is a sandy loam with a slightly alkaline pH (7.4). Erosion pavement is present on the surface, as are rocks of various sizes. Litter from the disked sagebrush and the drill rows of seeded grasses serve to slow down water movement. However, the higher incidence of pedestalled bunch grasses and small rills indicates that a significant amount of soil movement has taken place in the area. The soil is very loose and easily transported during high intensity summer storms. Although the seeding greatly increased the grass cover, patches of bare ground are prevalent between the drill rows.

The key shrub species on this site is Wyoming big sagebrush. Basin big sagebrush was supposedly encountered in 1987, but the crew in 1991 classified all the sagebrush as Wyoming big sagebrush. There is some hybridizing of the two species making identification difficult. Density was estimated at 3,466 plants/acre in 1987 and 3,199 by 1991. Density had declined by 29% in 1997, due to a die-off of decadent plants which accounted for 60% of the population in 1991. Of the sagebrush sampled in 1987, 94% percent were mature or decadent, and therefore, were established prior to the treatment. Currently, 92% of the population is mature or decadent. Utilization of the sagebrush has been moderate to heavy in 1987 and 1991, but light to moderate in 1997. There was a relatively large die-off of decadent plants in 1991. The die-off will continue, but not at as high a rate. The pattern of the die off is shown in the percentage of decadent plants that were classified as dying. Since 1987, this percentage has increased steadily from 12% in 1987, to 48% in 1991, and finally 56% in 1997. Vigor has improved and percent decadence has declined, however there is very little biotic potential or young plants in the population to replace the losses to the population. Therefore, the trend would continue to be slightly down.

Broom snakeweed is the second most abundant shrub, but it has declined steadily in density from 4,133 plants/acre in 1987 to only 220 in 1997. It currently provides less than 1% of the browse cover. Pinyon and juniper trees are found scattered throughout the site at densities estimated at 14 trees/acre for juniper and 42 trees/acre for pinyon in 1997. Overhead canopy cover of pinyon is currently estimated at 5%.

The herbaceous understory on the site is dominated by grasses, the most abundant of which is crested wheatgrass (seeded) and a warm season native, blue grama. Intermediate wheatgrass (also seeded) is less abundant and has declined in quadrat frequency from 34% in 1987 to only 4% in 1997. This site is probably marginal for intermediate wheatgrass since it is east of Mt. Dutton and within a rain shadow. Forbs are very limited with six species producing only 1% cover. Rangeland alfalfa was seeded on the site but it has not done well. It had a quadrat frequency of only 3% in 1987 and was not encountered in 1991 or 1997. The only common forbs include Newberry milkvetch and a cryptantha.

1991 TREND ASSESSMENT

Both vegetative basal and litter cover have been reduced dramatically since 1987. Bare ground, pavement, and rock cover have all increased. These respective increases and decreases indicate a downward trend for soil. Population density for the key browse species, Wyoming big sagebrush, has gone from 3,466 to 3,199 plants per acre, an 8% drop. Broom snakeweed has decreased by 36%. Even with the great decrease in broom snakeweed, the trend would still be slightly downward with the increase in the rate of decadency for Wyoming big sagebrush reaching 60%. Plants displaying poor vigor has also increased from 6% to 33%. Trend for the herbaceous understory is down slightly due to a significant decline in the sum of nested frequency of the seeded crested and intermediate wheatgrass. Nested frequency of blue grama increased significantly but this is a less desirable and less productive grass.

TREND ASSESSMENT
soil - slightly downward
browse - slightly downward
herbaceous understory - slightly downward

1997 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1991. Trend for the key browse species, Wyoming big sagebrush, is slightly down. Density has declined by 29% due to a die-off of decadent plants. However, density of mature plants increased slightly. Use is more light to moderate, vigor improved and percent decadence has declined from 60% to 34%. However, the percentage of decadent plants classified as dying has steadily increased since 1987, indicating further losses in the population. Recruitment is improved with increased numbers of seedling and young plants, but they are still inadequate to replace those that have died. A positive trend indicator is the 92% decline in the density of broom snakeweed which now numbers only 220 plants/acre. Trend for the herbaceous understory is stable but forbs are still very limited.

TREND ASSESSMENT
soil - stable
browse - slightly down
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 7

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Agropyron cristatum	$_{b}$207	$_{a}$169	$_{ab}$193	70	65	67	6.09
G	Agropyron intermedium	$_{b}$65	$_{a}$5	$_{a}$9	34	2	4	.04
G	Bouteloua gracilis	$_{a}$90	$_{a}$113	$_{b}$151	35	40	55	4.38
G	Bromus inermis	5	-	-	3	-	-	-
G	Dactylis glomerata	2	9	-	1	3	-	-
G	Oryzopsis hymenoides	2	9	6	2	5	3	.07
G	Poa secunda	-	-	2	-	-	1	.00
G	Sitanion hystrix	$_{b}$119	$_{b}$137	$_{a}$51	55	59	24	.68

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Stipa comata	12	11	20	5	6	8	.19
Total for Grasses		502	453	432	205	180	162	11.48
F	Astragalus newberryi	22	22	27	9	12	13	.06
F	Chenopodium spp. (a)	-	-	3	-	-	1	.00
F	Cryptantha spp.	$_{a}$17	$_{ab}$31	$_{b}$39	8	16	20	.59
F	Gayophytum ramosissimum (a)	-	-	21	-	-	8	.26
F	Medicago sativa	4	-	-	3	-	-	-
F	Sphaeralcea coccinea	-	-	6	-	-	3	.01
F	Streptanthus cordatus	-	-	2	-	-	2	.03
Total for Forbs		43	53	98	20	28	47	0.97

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 7

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	64	6.56
B	Gutierrezia sarothrae	8	.04
B	Juniperus osteosperma	1	-
B	Opuntia spp.	2	.03
B	Pinus edulis	3	6.07
Total for Browse		78	12.72

CANOPY COVER --
Herd unit 24 , Study no: 7

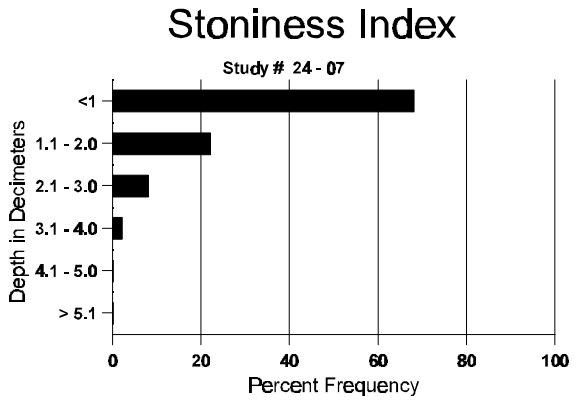
Species	Percent Cover '97
Pinus edulis	5

BASIC COVER --
Herd unit 24 , Study no: 7

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	306	10.00	7.25	26.76
Rock	218	4.25	6.25	3.86
Pavement	353	20.25	35.25	27.72
Litter	385	57.00	39.75	33.72
Cryptogams	-	0	0	0
Bare Ground	271	8.50	11.50	9.88

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 07

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
17.8	56.2 (16.6)	7.4	65.0	20.1	14.9	2.7	19.1	54.4	.5



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 7

Type	Quadrat Frequency '97
Rabbit	13
Elk	31
Deer	17
Cattle	4

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 7

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	87	2	1	-	-	-	-	-	-	-	3	-	-	-	200			3
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	87	19	4	9	-	-	-	-	-	-	29	3	-	-	2133	16	17	32
	91	7	8	2	-	1	-	-	-	-	17	-	1	-	1200	13	16	18
	97	49	16	1	-	-	-	-	-	-	64	2	-	-	1320	21	27	66
D	87	8	3	6	-	-	-	-	-	-	12	2	1	2	1133			17
	91	9	11	8	1	-	-	-	-	-	14	-	1	14	1933			29
	97	21	14	2	-	2	-	-	-	-	17	-	-	22	780			39
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	1100			55

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	15%	29%	06%	- 8%
'91	42%	21%	33%	-29%
'97	28%	03%	19%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	3466	Dec:	33%
	'91	3199		60%
	'97	2280		34%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Gutierrezia sarothrae																		
S	87	17	-	-	-	-	-	-	-	-	17	-	-	-	1133			17
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	14	-	-	-	-	-	-	-	-	14	-	-	-	933			14
	91	4	1	-	-	-	-	-	-	-	5	-	-	-	333			5
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	48	-	-	-	-	-	-	-	-	48	-	-	-	3200	8	6	48
	91	23	1	-	-	-	-	1	-	-	22	3	-	-	1666	5	6	25
	97	8	-	-	1	-	-	-	-	-	9	-	-	-	200	8	8	10
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	9	1	-	-	-	-	-	-	-	7	-	-	3	666			10
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-36%
'91	08%	00%	08%	-92%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	4133	Dec:	0%
	'91	2665		25%
	'97	220		0%

Juniperus osteosperma																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	1	-	-	-	-	-	-	-	-	-	1	-	-	66			1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	00%	00%	-70%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'91	66		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	87	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	91	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	7	1
	91	4	-	-	-	-	-	-	-	-	4	-	-	-	266	3	5	4
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	5	10	2
D	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-40%
'91	17%	00%	00%	-90%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	665	Dec:	20%
	'91	399		0%
	'97	40		0%

Pinus edulis																		
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	1	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	00%	00%	- 9%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'91	66		-
	'97	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Sclerocactus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	3	11	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	0		-

Trend Study 24-8-97

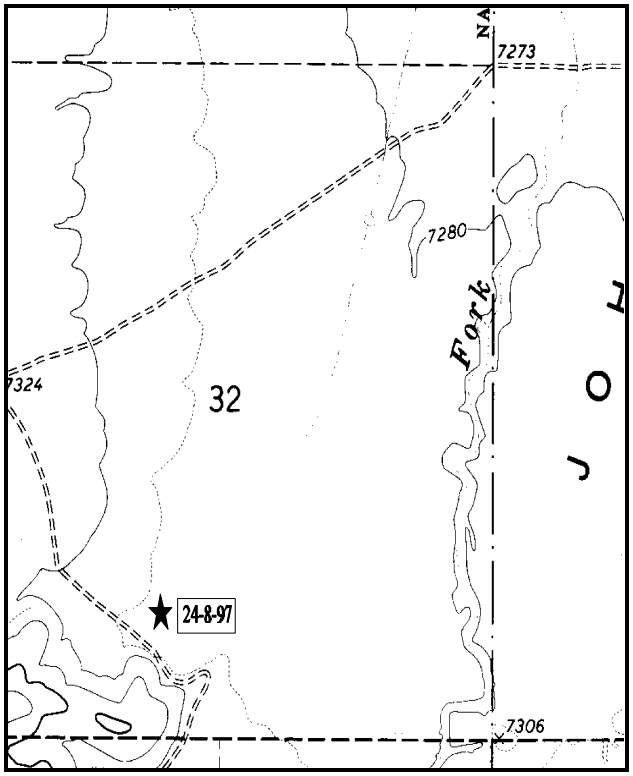
Study site name: Prospect Seeding . Range type: Big Sagebrush-Grass .

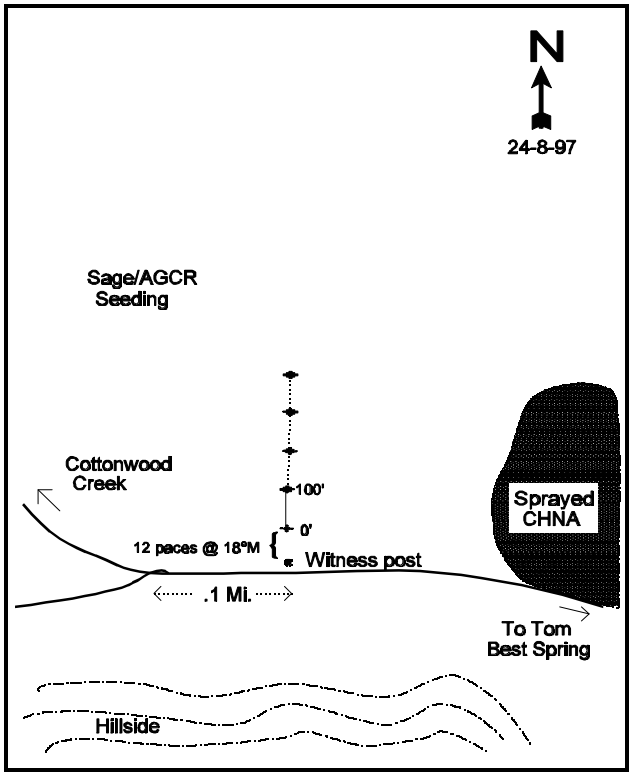
Compass bearing: frequency baseline 0 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11& 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From SR22, turn towards Cottonwood Creek (west onto the Mt. Dutton loop road) and travel about 2 miles to a major fork. Turn south towards Tom Best spring (Cottonwood AS is to the right, north) and go 0.3 miles to the U.S. Forest Service boundary fence. Cross the cattleguard and continue on the main road for 4.35 miles. The study area here is marked by a 4 foot green fencepost, and is north of the road in a sage-grass flat. The transect is marked by 1-foot tall fence posts.





Map Name: Cow Creek Diagrammatic Sketch

Township 33S , Range 2W , Section 32 UTM 4193647.916 N, 409124.480 E

DISCUSSION

Trend Study 24-8 (50-8)

The Prospect Seeding study is located approximately one-fourth mile north of Prospect Creek, and three-fourths of a mile west of the East Fork of the Sevier River, which cuts through the middle of John's Valley. The site is located on level ground at an elevation of 7,300 feet. The area is administered by the BLM. This site is located in the Lower Prospect Pasture of the Widtsoe C & H allotment. The area was disked and seeded in 1968. Wyoming big sagebrush has become reestablished and fairway crested wheatgrass provides nearly all the herbaceous forage. This is becoming a key area for elk during the winter and spring months. Antelope use the area during the summer and fall. This is not a critical winter range for mule deer. Pellet group data from 1997 estimate 48 elk, 13 deer, and 64 cattle days use/acre. Some sheep pellet groups were also encountered. Antelope and deer pellet groups are lumped due to the difficulty in differentiating between the two species.

The soils are moderately deep with an estimated effective rooting depth (see methods) of 23 inches. Soil texture is a sandy loam with a neutral pH (7.2). There is little rock but some pavement scattered on the surface. Harvester ant mounds are numerous in the area. Bare ground is abundant and although the site is fairly level, sheet erosion has occurred resulting in pedestaling of sagebrush and grasses to a height of about 2-3 inches in much of the area.

This is a Wyoming big sagebrush site with very little diversity in the understory. Sagebrush is a key species for antelope that use the area during the spring, summer and fall. The stand in 1987 was represented by mostly vigorous, young and mature plants, 26% and 66% respectively, out of a population of 9,066 plants/acre. Overall, the shrubs were only moderately hedged. During the 1991 reading, population density declined 26% to 6,665 plants/acre. Young plants declined to only 8% of the population and percent decadency increased to a staggering 79%. Utilization increased from 9% heavy use in 1987 to 58% in 1991. An additional 34% of the sagebrush was moderately hedged. By 1997, the sagebrush population continued to decline to 2,280 plants/acre, a 66% drop in numbers. Utilization is more moderate and percent decadence has declined to a more manageable 35%. There is some reproduction evident but not enough to replace the 460 decadent-dying plants per acre estimated. The pattern of a downward trend continues. The percentage of decadent plants that have been classified as dying has continually increased since 1987; 9% in 1987, 18% in 1991, and 58% in 1997. The ratio of dead to live currently is 1:1.5, or 40% of the sagebrush are dead. It appears that another 20% of the population will be lost. Therefore, trend for sagebrush is slightly down.

Crested wheatgrass was the only grass species encountered in 1997. Bottlebrush squirreltail and Russian wildrye were observed on the study site in small numbers in 1991. Crested wheatgrass provides a consistent ground cover but is not continuous. Forbs are very rare.

1991 TREND ASSESSMENT

The soil trend for this site is reasonably stable, but it still has over 60% bare ground and should be considered in very poor condition. The key browse, Wyoming big sagebrush, has decreased in numbers by 26%. This decrease could be beneficial later when the extended drought ends. With the lower densities, vigor could be increased, for the density was too high for the site potential. The effect of the drought is still being felt with the rate of decadency increasing from 8 to 79%. Heavy hedging (extended drought is exacerbating this use) of the sagebrush has drastically increased from 9% to 58%. Trend for browse would be considered down. As for the herbaceous understory, there is only one forb (a weedy increaser) and one major grass being crested wheatgrass. With the drought, it's numbers are decreasing. The trend would be considered slightly downward.

TREND ASSESSMENT
soil - stable, but poor condition with over 60% bare soil
browse - down
herbaceous understory - slightly downward, poor species diversity

1997 TREND ASSESSMENT

Trend for soil is stable (because of the level terrain), but with the abundance of unprotected bare soil, it is in poor condition. Trend for browse slightly down. Population density has declined further by 66%. This reduction comes almost entirely from a die-off of decadent plants resulting in a smaller but healthier population. Percent decadence has declined from 79% in 1991 to 35% currently. However, again the percentage of decadent plants classified as dying has steadily increased since 1987, where it has now at 58%. Currently, 40% of the population is dead, and with poor recruitment utilization is more moderate, the population will continue to decline in the future for there are not enough seedlings and young to replace the dead plants. Trend for the herbaceous understory is up slightly due to an increase in the sum of nested frequency of crested wheatgrass. Forbs are still severely lacking.

TREND ASSESSMENT
soil - stable, but poor condition
browse - slightly downward
herbaceous understory - up slightly, but poor diversity

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 8

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Agropyron cristatum	$_{ab}$215	$_{a}$191	$_{b}$258	85	78	90	12.21
G	Elymus junceus	-	3	-	-	3	-	-
G	Sitanion hystrix	3	7	-	2	2	-	-
Total for Grasses		218	201	258	87	83	90	12.21
F	Chenopodium album (a)	$_{a}$8	$_{a}$16	$_{b}$36	4	9	17	.33
F	Cryptantha spp.	-	-	1	-	-	1	.00
Total for Forbs		8	16	37	4	9	18	0.34

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 8

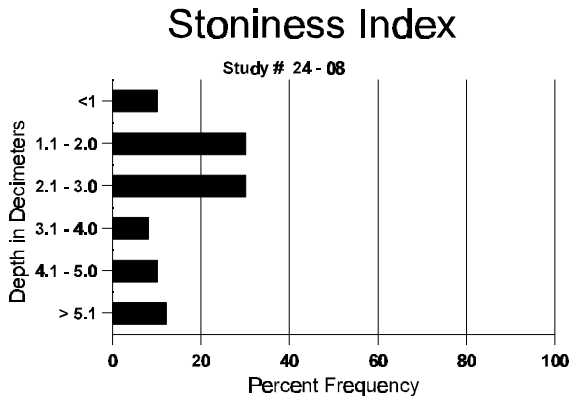
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia tridentata wyomingensis	63	2.80
B	Chrysothamnus nauseosus	1	-
Total for Browse		64	2.80

BASIC COVER --
Herd unit 24 , Study no: 8

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	284	4.50	5.25	15.66
Rock	44	0	0	.11
Pavement	348	3.50	8.25	11.48
Litter	376	25.00	26.00	13.57
Cryptogams	15	0	0	.46
Bare Ground	371	67.00	60.50	46.99

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 08

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
23.1	55.4 (17.6)	7.2	54.4	30.1	15.6	1.8	12.7	921.6	.6



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 8

Type	Quadrat Frequency '97
Sheep	1
Rabbit	37
Elk	21
Deer	12
Cattle	8

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 8

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
Y	87	13	20	2	-	-	-	-	-	-	35	-	-	-	2333			35
	91	-	4	3	-	1	-	-	-	-	8	-	-	-	533			8
	97	9	-	-	-	-	-	-	-	-	9	-	-	-	180			9
M	87	17	63	10	-	-	-	-	-	-	87	2	1	-	6000	14	12	90
	91	-	3	9	1	-	-	-	-	-	13	-	-	-	866	8	9	13
	97	27	35	3	-	-	-	-	-	-	65	-	-	-	1300	13	17	65
D	87	4	7	-	-	-	-	-	-	-	10	-	-	1	733			11
	91	5	20	43	1	6	3	1	-	-	63	-	2	14	5266			79
	97	28	9	1	-	2	-	-	-	-	15	-	2	23	800			40
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	1480			74

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	66%	09%	01%	-26%
'91	34%	58%	16%	-66%
'97	40%	04%	22%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	9066	Dec:		8%
'91	6665			79%
'97	2280			35%

Chrysothamnus nauseosus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'91	0			-
'97	20			-

Trend Study 24-9-97

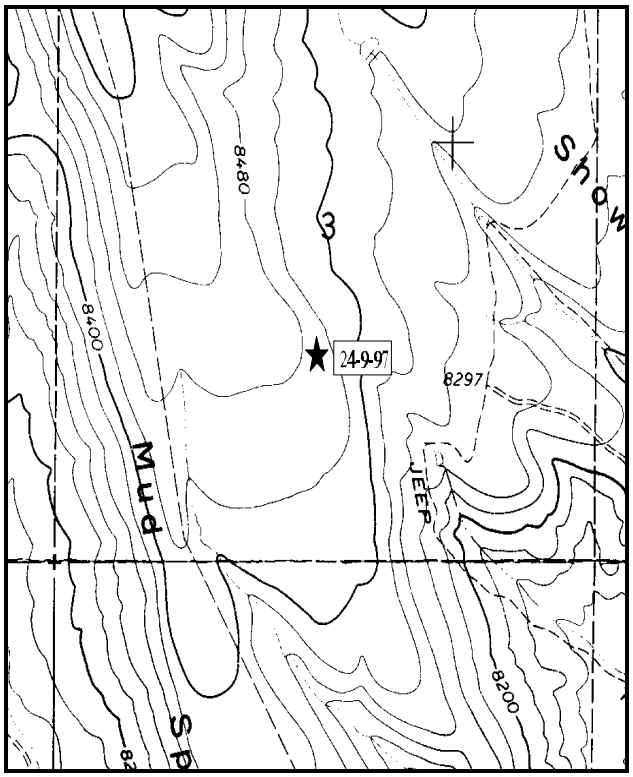
Study site name: Mud Spring . Range type: Black Sagebrush .

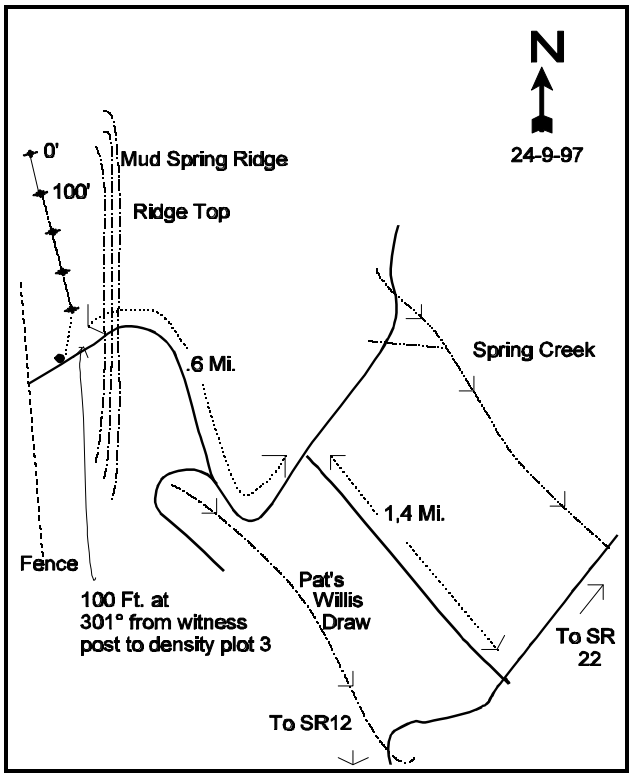
Compass bearing: frequency baseline 167 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95 ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From SR 22, about 1 1/2 miles south of Widstoe Junction, turn west onto the road leading to Tom Best Spring and Highway 12. Proceed 4.2 miles to the U.S. Forest Service boundary. Continue on the main road for 5.3 miles to an intersection at Showalter Creek. Continue on the main road 1 mile to a faint road on the right. Turn and go up towards Mud Spring Ridge 1.4 miles to a T-intersection. Turn left and go 0.6 miles up a faint, rough road to the top of the ridge and a witness post identifying the study area. The 400-foot stake is 100 feet northwest of the witness post. The start of the transect is actually 400 feet north, and runs back south towards the road. Study markers are 1-foot tall fence posts.





Map Name: Flake Mountain West Diagrammatic Sketch

Township 35S ,Range 4W , Section 3 UTM 4182639.615 N, 393177.484 E

DISCUSSION

Trend Study 24-9 (50-9)

The Mud Spring Ridge study site is located on a gently sloping (3-5%), sagebrush covered bench with an aspect to the east-southeast, at an elevation of 8,480 feet. Spring Creek is east of the site and Pat Willis Draw lies to the southeast. The southern aspect, coupled with sufficient wind, limits snow depth on this area during much of the winter. Black sagebrush is the dominant shrub on this site, and a variety of grasses and forbs occupy the understory. This is a key wintering area for elk. Several deer were seen near the site in 1997 and there was evidence that moderately high numbers of deer and elk have been using the site. Quadrat frequency of deer pellet groups was 22% while elk numbered 34%. Cattle also use the area and were seen in the vicinity by a stock pond in 1997.

Soil depth is moderately shallow, as evidenced by the predominance of the shallow rooted black sagebrush. Effective rooting depth (see methods) is estimated almost 12 inches. Soil texture at the site is a sandy clay loam with a slightly acidic pH (6.1). Soil temperature was 53ºF at 14 inches. Rocks are common on the surface and throughout the profile. They are generally less than three inches in diameter. Erosion pavement is present on the soil surface, indicating some sheet erosion has taken place over time. Many plants are pedestaled, but overall, the erosion potential on this site is currently low to moderate, given the rocky soil and gentle slope. Ground cover appears adequate to limit surface runoff and to promote infiltration.

The key shrub species at the site is black sagebrush. This shrub accounts for 63% of the browse cover in 1997. There is also some isolated patches of mountain big sagebrush on the site where the soils are invariably deeper. Black sagebrush has had a moderately high density since 1987 when 12,065 plants/acre were estimated. Seedlings were abundant and young plants accounted for 30% of the population. By 1991, density increased to 22,733 plants/acre with an increase in density for all age classes. Use was light to moderate in 1987 and 1991 with good vigor and low decadence. Density declined 56% in 1997 partly due to the larger sample used that year. The current population numbers 9,920 plants/acre, 69% of which are classified as mature. Recruitment is down from the high numbers previously found, therefore there are not sufficient numbers to maintain the current population. Utilization is mostly light and percent decadence low at 17%. As has been previously noted on other sites, this site is no different, the percentage of decadent plants classified as dying has shown a continual increase since 1987; 12% in 1987, 14% in 1991, and a high of 63% in 1997. This would indicate further reductions in the black sagebrush population.

The site also supports a fairly high density of stickyleaf low rabbitbrush and dwarf rabbitbrush. These two species of rabbitbrush appear to have been lumped together as stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus viscidiflorus*) in 1987 and 1991. Density of rabbitbrush increased from 9,333 plants/acre in 1987 to 14,666 in 1991. Dwarf and stickyleaf low rabbitbrush currently number a combined 4,920 plants/acre. Seedlings and young plants are much less common now and the population appears stable. Prickly phlox is another less desirable shrub which has declined substantially since 1991.

The herbaceous understory is diverse and fairly abundant for a black sagebrush site. Seven perennial grasses and one sedge combine to produce over 13% cover in 1997. Twenty-seven forbs were also identified in 1997, but only a few are very common. The most abundant grass species are mutton bluegrass, a sedge, and Letterman needlegrass. The abundance of forbs on this site may be a response to heavy livestock grazing pressure in the past.

1991 TREND ASSESSMENT

Most basic cover parameters are almost unchanged since 1987, but two of the more important have changed. Litter cover has been reduced from 54% to 46% while bare ground has increased from 19% to 29%. This would indicate a downward trend, making the soil more susceptible to soil loss with late summer high intensity storms. Trend for the browse component of the community would be up, because the key species, black sagebrush, has almost doubled it's population with only a slight increase in percent decadency. Because of the high diversity for both forbs and grasses on the site and that on average, about half increased and the other half decreased in quadrat frequency, the trend appears stable at this time. An end to the extended drought will help many of the species to recover in a fairly short time.

TREND ASSESSMENT
soil - slightly downward
browse - upward
herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil appears stable. Percent bare ground declined slightly but litter cover also continued to decline. Trend for the key browse species, black sagebrush, is down slightly. Density has declined 56% since 1991, and there has been an obvious substantial reduction in density from all age classes. The lack of large numbers of dead plants suggests that some of the change in density, of mature and decadent plants, is due to the much larger sample size used in 1997. The current population of 9,920 plants/acre is at a more sustainable level. However, as pointed out in the discussion, the percentage of decadent plants classified as dying has continued to increase since 1987, with it being at a high of 63% at this time. There has also been a decline in the densities of rabbitbrush and prickly phlox, two less desirable increaser shrubs. Trend for the herbaceous understory appears to be stable. Sum of nested frequency for grasses has remained similar since 1991.

TREND ASSESSMENT
soil - stable
browse - down slightly for black sagebrush
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 9

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Agropyron smithii	3	7	13	1	4	6	.34
G	Bouteloua gracilis	29	23	20	16	13	10	.15
G	Carex spp.	a62	b102	ab79	28	43	33	2.15
G	Poa fendleriana	a-	a-	b158	-	-	57	3.26
G	Poa secunda	b211	b218	a44	77	82	17	1.27
G	Sitanion hystrix	b102	a65	a33	45	31	17	.21
G	Stipa comata	51	34	43	21	15	19	.86
G	Stipa lettermani	a146	b179	b219	73	75	87	5.17
Total for Grasses		604	628	609	261	263	246	13.44
F	Antennaria rosea	a14	a16	b42	6	8	16	1.27
F	Arabis spp.	b20	a3	a1	12	1	1	.00
F	Astragalus humistratus	c151	b14	a-	61	7	-	-
F	Astragalus newberryi	-	4	-	-	2	-	-
F	Aster spp.	-	-	3	-	-	1	.00
F	Astragalus spp.	a-	b29	c96	-	14	45	.73
F	Balsamorhiza ssp.	-	3	-	-	1	-	-
F	Castilleja linariaefolia	b42	a1	a3	21	1	3	.02
F	Chaenactis douglasii	4	-	4	2	-	1	.00
F	Cirsium spp.	b46	ab35	a23	23	15	10	.37
F	Crepis acuminata	-	7	-	-	3	-	-
F	Cryptantha spp.	-	3	1	-	1	1	.03
F	Erigeron eatonii	c246	b215	a31	90	81	15	.20
F	Erigeron pumilus	a-	a-	b16	-	-	7	.06
F	Eriogonum racemosum	223	214	185	86	84	76	1.45
F	Eriogonum umbellatum	75	80	57	36	38	28	.56
F	Galium boreale	-	-	5	-	-	2	.01
F	Hymenoxys acaulis	a-	a-	b6	-	-	4	.04
F	Hymenopappus filifolius	-	4	-	-	2	-	-
F	Linum lewisii	-	-	1	-	-	1	.03
F	Lotus utahensis	b24	ab14	a1	14	8	1	.00
F	Lupinus pusillus (a)	3	-	-	1	-	-	-
F	Lupinus sericeus	b65	a38	ab51	36	20	26	1.33
F	Lygodesmia spinosa	10	14	16	6	5	7	.10
F	Microsteris gracilis (a)	-	-	2	-	-	1	.00

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
F	Orthocarpus spp. (a)	-	-	2	-	-	2	.01
F	Penstemon comarrhenus	$_{b}$16	$_{a}$4	$_{a}$5	9	2	2	.01
F	Phlox longifolia	$_{a}$-	$_{a}$-	$_{b}$19	-	-	8	.04
F	Potentilla diversifolia	7	2	10	4	2	5	.22
F	Polygonum douglasii (a)	-	-	23	-	-	10	.05
F	Senecio multilobatus	$_{b}$71	$_{a}$4	$_{a}$21	35	3	12	.18
F	Sphaeralcea coccinea	$_{a}$-	$_{a}$-	$_{b}$11	-	-	4	.04
F	Taraxacum officinale	-	2	3	-	2	1	.00
Total for Forbs		1017	706	638	442	300	290	6.82

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 9

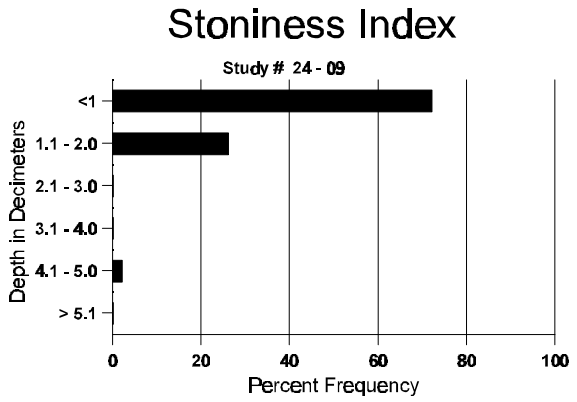
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia nova	78	12.12
B	Artemisia tridentata vaseyana	13	1.64
B	Chrysothamnus depressus	45	3.40
B	Chrysothamnus nauseosus albicaulis	6	.01
B	Chrysothamnus parryi	2	.03
B	Chrysothamnus viscidiflorus viscidiflorus	28	1.90
B	Gutierrezia sarothrae	1	-
B	Leptodactylon pungens	12	.02
B	Symphoricarpos oreophilus	1	-
B	Tetradymia canescens	1	-
Total for Browse		187	19.15

BASIC COVER --
Herd unit 24 , Study no: 9

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	269	10.75	10.50	29.07
Rock	222	8.00	9.25	8.10
Pavement	277	8.25	4.75	6.79
Litter	382	53.75	46.25	30.77
Cryptogams	32	0	.25	.13
Bare Ground	316	19.25	29.00	22.82

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 09

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
11.6	53.4 (14.1)	6.1	48.7	25.4	25.8	2.7	11.9	275.2	.5



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 9

Type	Quadrat Frequency '97
Rabbit	8
Elk	34
Deer	22
Cattle	8

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 9

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
S	87	36	-	-	-	-	-	-	-	-	36	-	-	-	2400			36
	91	233	-	-	26	-	-	2	-	-	260	1	-	-	17400			261
	97	24	-	-	-	-	-	-	-	-	24	-	-	-	480			24
Y	87	50	5	-	-	-	-	-	-	-	51	-	4	-	3666			55
	91	104	12	-	-	-	-	1	-	-	117	-	-	-	7800			117
	97	63	-	-	9	-	-	-	-	-	72	-	-	-	1440			72
M	87	84	24	1	-	-	-	-	-	-	97	2	9	1	7266	11	13	109
	91	132	20	2	2	2	-	-	-	-	157	1	-	-	10533	13	14	158
	97	328	14	-	-	-	-	-	-	-	337	-	5	-	6840	12	19	342
D	87	14	3	-	-	-	-	-	-	-	11	-	4	2	1133			17
	91	33	18	-	12	3	-	-	-	-	56	-	1	9	4400			66
	97	78	4	-	-	-	-	-	-	-	30	-	-	52	1640			82
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	2	-	-	-	-	-	-	-	-	-	-	-	-	680			34

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	18%	.55%	11%	+47%
'91	16%	.58%	03%	-56%
'97	04%	00%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	12065	Dec:	9%
	'91	22733		19%
	'97	9920		17%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66	10	11	1
	97	10	1	-	-	-	-	-	-	-	11	-	-	-	220	24	34	11
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	4	2	-	-	-	-	-	-	-	5	-	-	1	120			6
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Appeared
'91	00%	00%	00%	+81%
'97	18%	00%	06%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		0%
'91	66			0%
'97	340			35%

Chrysothamnus depressus

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	29	-	-	-	-	-	-	-	-	29	-	-	-	580			29
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	123	-	-	-	-	-	-	-	-	123	-	-	-	2460	5	8	123

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'91	0			-
'97	3040			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus albicaulis																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	3	1	1	-	-	-	-	-	-	5	-	-	-	333			5
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	1	1	2	-	-	-	-	-	-	4	-	-	-	266	5	6	4
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80	7	10	4
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	1	4	-	-	1	-	-	-	6	-	-	-	400			6
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Appeared
'91	20%	53%	00%	-82%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'87	0	Dec:		0%
	'91	999			40%
	'97	180			0%

Chrysothamnus parryi																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60	9	10	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)					
	'87	0	Dec:		-
	'91	0			-
	'97	80			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
S	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	11	-	-	-	-	-	1	-	-	12	-	-	-	800			12
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	45	-	-	-	-	-	-	-	-	45	-	-	-	3000			45
	91	49	1	2	4	-	-	-	-	-	56	-	-	-	3733			56
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	92	-	-	-	-	-	-	-	-	85	-	5	2	6133	4	6	92
	91	48	14	79	6	1	1	-	-	-	148	-	1	-	9933	5	8	149
	97	75	2	-	16	-	-	-	-	-	93	-	-	-	1860	14	23	93
D	87	2	-	1	-	-	-	-	-	-	2	-	-	1	200			3
	91	2	-	12	1	-	-	-	-	-	11	-	-	4	1000			15
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	.71%	06%	+36%
'91	07%	43%	02%	-87%
'97	02%	00%	01%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	9333	Dec:	2%
	'91	14666		7%
	'97	1880		1%

Gutierrezia sarothrae																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	5	3	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	6	6	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Died out
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'91	0		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Leptodactylon pungens																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	91	51	1	-	5	-	-	5	-	-	61	-	1	-	4133			62
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	30	-	-	-	-	-	-	-	-	30	-	-	-	2000	5	3	30
	91	49	-	-	12	-	-	-	-	-	59	-	2	-	4066	4	5	61
	97	18	-	-	4	-	-	-	-	-	22	-	-	-	440	6	7	22
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+73%
'91	.80%	00%	02%	-94%
'97	00%	00%	04%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	2266	Dec:	0%
	'91	8265		1%
	'97	460		4%

Opuntia spp.																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	5	4	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	2	5	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Died out
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'91	0		-
	'97	0		-

Symphoricarpos oreophilus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20	12	30	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Tetradymia canescens																		
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	1	-	-	-	-	-	-	-	1	-	-	-	66	8	6	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	33%	00%	00%	+ 1%
'91	00%	00%	00%	-90%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	199	Dec:	-
	'91	200		-
	'97	20		-

Trend Study 24-10-97

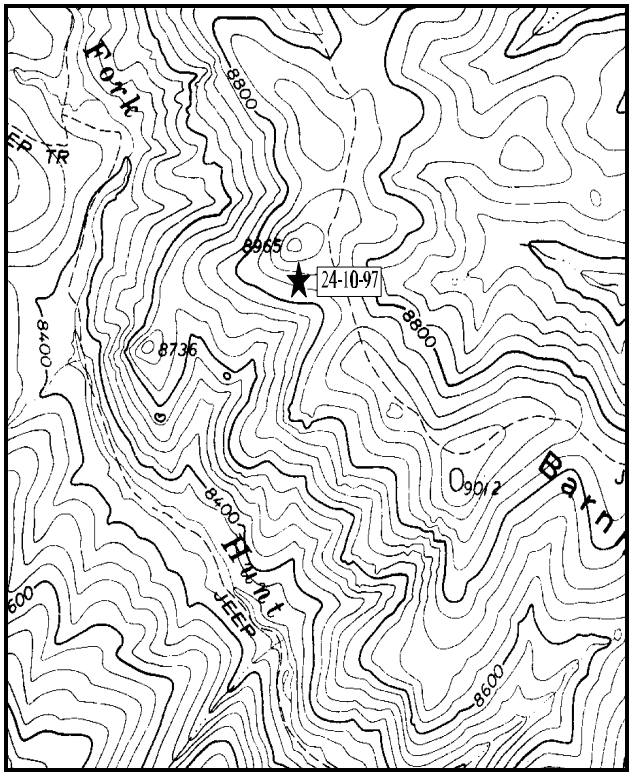
Study site name: Barnhurst Ridge . Range type: Mixed Mountain Brush .

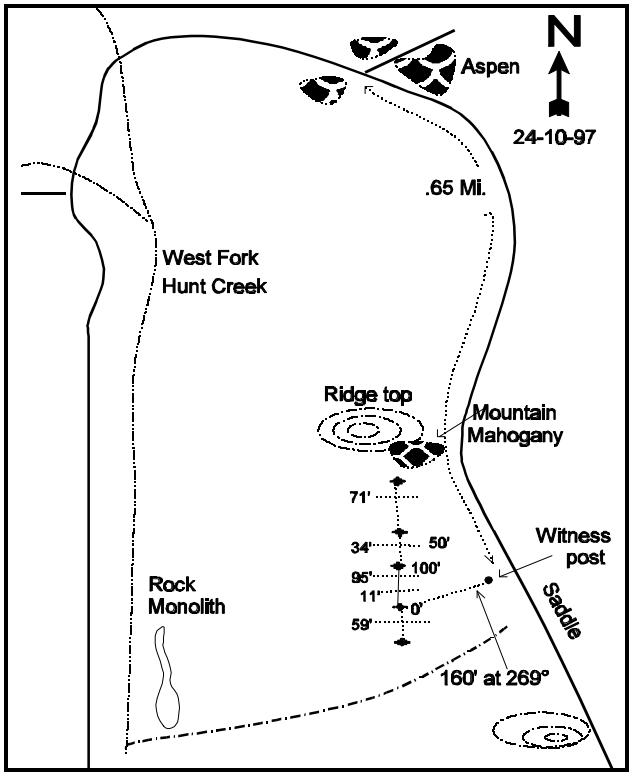
Compass bearing: frequency baseline 160 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34 ft), line 3 (71ft), line 4 (59ft).

LOCATION DESCRIPTION

Go west off of SR 22 south of Widstoe Junction on the Tom Best Spring-Flake Mountain graveled road. Proceed 9.5 miles west on this road to the Showalter Creek intersection (6.5 mi. from Tom Best Spring turnoff on Highway 12 to Showalter Creek). Turn right and go 1 mile. Turn right towards West Hunt Creek. Go up 0.6 miles to a cattleguard. Continue 0.9 miles to a fork, keep left. Follow along the creek for 2.35 miles, then cross creek. Go 0.8 miles and cross back to south side of creek. Continue up the main canyon 0.95 miles to a fork and "Primitive Road" sign. Continue straight down into creek (left fork goes to Hancock Creek). Drive through the creek, then out and up 0.5 miles to a fork above the draw on the north side of Hunt Creek. Bear right at this fork and proceed 0.65 miles to a witness post on the right side of the road below a clump of mountain mahogany and before the saddle. The transect samples the slope on the west side of the road, starting with the 0-foot baseline stake 160 feet bearing 269 degrees from the witness post. This short fencepost is tagged #7840.





Map Name: Flake Mountain West Diagrammatic Sketch

Township 34S , Range 4W , Section unsurveyed UTM 4190009.053 N, 384056.446 E

DISCUSSION

Herd Unit 24-10 (50-10)

The Barnhurst Ridge study is located on Barnhurst Ridge at an elevation of 8,880 feet. This is a key area for elk use year-round. Quadrat frequency of deer and elk pellet groups are relatively similar at 10% and 12% respectively in 1997. The terrain is steep and the south slopes can be used during the winter where curlleaf mountain mahogany, serviceberry, mountain big sagebrush, and bitterbrush are found. A variety of grasses are also available on the basically snow-free slopes. The north-facing slopes are dramatically different, providing habitat suitable for elk during the summer months. Here aspen and conifers prevail, and adequate forage production is provided by grasses and forbs in the aspen understory. This site is positioned near the top of a southwest facing slope of 28% which appears steeper than it is. The site runs from Barnhurst Ridge to the West Fork of Hunt Creek.

The soil is a medium textured sandy clay loam that is moderately shallow and rocky. Effective rooting depth (see methods) is estimated at 10 inches. However, fractured bedrock must be accommodating the deeper rooted antelope bitterbrush and curlleaf mountain mahogany. The percent ground cover provided by rock and pavement is considerable, currently at 42%. There is evidence of overland flow of runoff, but erosion is minimal due to the high amounts of rock on the surface.

The key browse species are mountain big sagebrush, antelope bitterbrush, and curlleaf mountain mahogany. These species contribute respectively 53%, 27% and 7% of the overall browse cover. All are important sources of forage when herbaceous species are unavailable. Bitterbrush density has steadily declined since 1987 when 3,200 plants/acre were estimated. In 1991, the population declined 13% and percent decadence increased from 0 to 21%. The larger sample used in 1997 estimates 1,080 plants/acre of which 89% are mature. With no dead plants in the population, this decrease is a by-product of the much larger sample size giving more accurate estimates of species with discontinuous distributions. There were no seedlings and only 120 young plants/acre estimated in 1997. Utilization of this preferred shrub has remained moderate to heavy since 1987.

Mountain big sagebrush appears to have a slightly declining population. Density declined 24% between 1987 and 1991, then 28% between 1991 and 1997. Use of the sagebrush was moderate to heavy on 55% of the plants in 1987, but more moderate in 1991 and 1997. Poor vigor and an increase in decadence were noted in 1991, yet they have since declined to similar levels of 1987. The current population appears to continue to decline as indicated by the percentage of decadent plants classified as dying has continued to increase to its highest value since 1987 at 44%. The number of seedlings and percent young age class do not appear to be capable of maintaining the population at its current level.

Curlleaf mountain mahogany is composed of a small and increasingly mature population. Average mature plants measure just under four feet in height. Use has been light to moderate, although the population has a steadily declining number of seedlings and young, it is not critical for a very long-lived species. The decrease in the estimated population is more reflective of a much larger sample giving better estimates, rather than any real losses for there are no dead plants in the population.

The herbaceous understory is lacking on this site. Seven perennial grass species produce just under 7% cover. Forbs are extremely rare. The most abundant grasses include mutton bluegrass and letterman needlegrass. Combined, they produce 74% of the grass cover. Western wheatgrass, blue grama, and squirreltail are also fairly common. It appears that Sandberg and mutton bluegrass were combined and called Sandberg bluegrass in 1987 and 1991. Barnhurst ridge is located in the West Hunt Pasture, which is part of a five pasture deferred rotation grazing system. Barnhurst ridge grazing is deferred until grass seed have matured each year. Past use by sheep probably accounts for the lack of forbs relative to grasses on the site.

1991 TREND ASSESSMENT

Vegetative basal cover has decreased from 12% down to 7%. There has also been some decreases in rock cover, compensated by increases in percent pavement. Most importantly, percent bare ground has more than doubled to 12%. Trend for soil is slightly downward at this time. The three major browse species, mountain big sagebrush, antelope bitterbrush, and curlleaf mountain mahogany, all have noted decreases in their respective populations of 24%, 13%, and 22%. Percent decadency has also gone up for sagebrush and bitterbrush. Trend for the key species is slightly downward. Most of the grasses on the site are small and not very productive but sum of nested frequency for grasses has remained similar. The forb diversity is good, but none occur in very high frequencies. Trend for the herbaceous understory is stable.

TREND ASSESSMENT
soil - slightly downward
browse - slightly downward
herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil is currently stable. Percent bare ground declined slightly but litter cover also declined and pavement cover increased. Trend for key browse is considered slightly down with densities of the three key species declining since 1991. The change in density of sagebrush and bitterbrush comes primarily from the young and decadent age classes. Mountain big sagebrush, which makes up the majority of the key browse, is experiencing further declines in its population. This is illustrated by inspection of the percentage of decadent plants that are classified as dying, this has steadily increased since 1987. Currently, it is at its highest value of 44%. Eighteen percent of the population is dead, this will likely increase to about 25% in the future. Trend for the herbaceous understory is slightly down. Sum of nested frequency of grasses has declined slightly with a significant decline in western wheatgrass, bottlebrush squirreltail and the combined frequency of Sandberg and mutton bluegrass. Forbs are still depleted.

TREND ASSESSMENT
soil - stable
browse - slightly down
herbaceous understory - slightly down and depleted

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 10

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Agropyron smithii	$_{ab}$15	$_{a}$8	$_{b}$29	6	4	13	.73
G	Bouteloua gracilis	52	53	34	22	19	12	.37
G	Bromus tectorum (a)	-	-	1	-	-	1	.00
G	Festuca ovina	-	4	4	-	2	1	.03
G	Poa fendleriana	$_{a}$-	$_{a}$-	$_{b}$134	-	-	54	3.25
G	Poa secunda	$_{b}$217	$_{b}$227	$_{a}$22	85	88	11	.13
G	Sitanion hystrix	$_{b}$107	$_{b}$96	$_{a}$35	54	44	19	.43
G	Stipa lettermani	$_{a}$3	$_{a}$-	$_{b}$33	1	-	11	1.77
Total for Grasses		394	388	292	168	157	122	6.74
F	Agoseris glauca	-	2	-	-	1	-	.00
F	Arabis spp.	5	4	-	2	1	-	-
F	Astragalus utahensis	3	8	1	2	4	1	.00
F	Chaenactis douglasii	3	1	1	3	1	1	.00
F	Cirsium spp.	-	-	3	-	-	2	.01
F	Collinsia parviflora (a)	-	-	3	-	-	1	.00
F	Crepis acuminata	-	4	-	-	2	-	-
F	Cruciferae	-	1	-	-	1	-	-
F	Gayophytum ramosissimum (a)	-	-	17	-	-	8	.04
F	Gilia spp. (a)	-	-	9	-	-	4	.04
F	Hymenoxys richardsonii	1	3	-	1	1	-	-
F	Petradoria pumila	-	1	-	-	1	-	.03
F	Senecio multilobatus	3	1	-	1	1	-	.00
F	Trifolium spp.	1	-	-	1	-	-	-
Total for Forbs		16	25	34	10	13	17	0.15

BROWSE TRENDS --
Herd unit 24 , Study no: 10

Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia frigida	1	.03
B	Artemisia tridentata vaseyana	79	13.60
B	Cercocarpus ledifolius	7	1.85
B	Chrysothamnus nauseosus albicaulis	0	.00
B	Chrysothamnus parryi	2	.15
B	Chrysothamnus viscidiflorus viscidiflorus	2	.06
B	Eriogonum microthecum	1	-
B	Gutierrezia sarothrae	14	.18
B	Pinus edulis	1	1.85
B	Purshia tridentata	39	7.05
B	Symphoricarpos oreophilus	8	1.08
Total for Browse			25.88

CANOPY COVER --
Herd unit 24 , Study no: 10

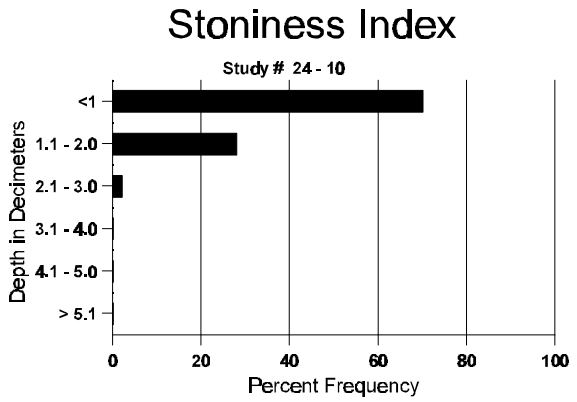
Species	Percent Cover '97
Cercocarpus ledifolius	4
Pinus edulis	3

BASIC COVER --
Herd unit 24 , Study no: 10

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	261	12.25	6.50	32.37
Rock	286	24.25	18.25	17.65
Pavement	314	13.25	15.75	24.24
Litter	373	44.50	47.25	30.19
Cryptogams	10	.50	0	.08
Bare Ground	213	5.25	12.25	7.72

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 10

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
10.0	49.8 (11.7)	6.6	52.7	25.7	21.6	2.8	11.2	307.2	.4



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 10

Type	Quadrat Frequency '97
Rabbit	10
Elk	12
Deer	10

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 10

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia frigida																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	11	7	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	87	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
Y	87	14	2	-	-	-	-	-	-	-	16	-	-	-	1066			16
	91	3	3	-	-	-	-	1	-	-	7	-	-	-	466			7
	97	25	-	-	-	-	-	-	-	-	25	-	-	-	500			25
M	87	20	27	8	-	-	-	-	-	-	55	-	-	-	3666	20	23	55
	91	22	9	1	3	-	-	-	-	-	31	1	3	-	2333	23	24	35
	97	77	26	-	-	-	-	-	-	-	102	1	-	-	2060	23	45	103
D	87	6	7	5	-	-	-	-	-	-	17	-	-	1	1200			18
	91	17	7	-	2	-	-	-	-	-	12	-	3	11	1733			26
	97	29	6	-	1	-	-	-	-	-	19	-	1	16	720			36
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	720			36

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	40%	15%	01%	-24%
'91	28%	01%	25%	-28%
'97	20%	00%	10%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	5932	Dec:		20%
'91	4532			38%
'97	3280			22%

Cercocarpus ledifolius																		
S	87	20	-	-	-	-	-	-	-	-	20	-	-	-	1333			20
	91	2	-	-	1	-	-	3	-	-	6	-	-	-	400			6
	97	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2
Y	87	18	-	-	-	-	-	-	-	-	18	-	-	-	1200			18
	91	3	2	-	6	-	-	3	-	-	14	-	-	-	933			14
	97	-	1	-	2	-	-	-	-	-	3	-	-	-	60			3
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	4	2	-	-	-	-	-	1	-	7	-	-	-	140	45	59	7

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-22%
'91	14%	00%	00%	-79%
'97	30%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	1200	Dec:		-
'91	933			-
'97	200			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus nauseosus albicaulis																		
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	12	7	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	10	21	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Died out
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	66	Dec:		-
'91	0			-
'97	0			-

Chrysothamnus parryi																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	9	17	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'91	0			-
'97	40			-

Chrysothamnus viscidiflorus viscidiflorus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66	8	10	1
	97	1	-	-	1	-	-	-	-	-	2	-	-	-	40	-	-	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	Appeared
'91	00%	00%	00%	-39%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'87	0	Dec:		-
'91	66			-
'97	40			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum microthecum																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	2	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	40		-

Gutierrezia sarothrae																		
S	87	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	91	7	-	-	-	-	-	-	-	-	7	-	-	-	466			7
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	28	-	-	-	-	-	-	-	-	28	-	-	-	1866	9	7	28
	91	8	-	-	1	-	-	-	-	-	9	-	-	-	600	7	7	9
	97	17	-	-	-	-	-	-	-	-	17	-	-	-	340	8	10	17
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	2	-	-	-	-	-	-	-	-	1	-	-	1	133			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-51%
'91	00%	00%	06%	-72%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	2466	Dec:	0%
	'91	1199		11%
	'97	340		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Mahonia repens																		
Y	87	2	-	-	-	-	-	-	-	-	1	1	-	-	133			2
	91	-	-	-	1	-	-	1	-	-	2	-	-	-	133			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	6	3	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-33%
'91	00%	00%	00%	Died out
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	199	Dec:	-
	'91	133		-
	'97	0		-

Opuntia spp.																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	1	-	-	-	-	-	-	-	-	1	-	-	-	66	4	9	1
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	00%	00%	Died out
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'91	66		-
	'97	0		-

Pinus edulis																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Purshia tridentata																		
S	87	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	87	10	5	-	-	-	-	-	-	-	15	-	-	-	1000			15
	91	6	2	1	3	2	-	2	-	-	16	-	-	-	1066			16
	97	4	-	-	2	-	-	-	-	-	6	-	-	-	120			6
M	87	3	18	12	-	-	-	-	-	-	33	-	-	-	2200	26	24	33
	91	-	9	3	1	1	3	-	-	-	17	-	-	-	1133	23	25	17
	97	7	24	12	3	2	-	-	-	-	48	-	-	-	960	17	42	48
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	1	5	2	-	1	-	-	-	-	7	-	2	-	600			9
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	48%	25%	00%	-13%
'91	48%	21%	05%	-61%
'97	48%	22%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	3200	Dec:	0%
	'91	2799		21%
	'97	1080		0%

Symphoricarpos oreophilus																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133			2
	91	1	-	-	1	-	-	-	-	-	2	-	-	-	133			2
	97	-	-	-	5	-	-	-	-	-	5	-	-	-	100			5
M	87	1	1	-	-	-	-	-	-	-	2	-	-	-	133	10	13	2
	91	2	2	-	1	-	-	5	-	-	10	-	-	-	666	13	9	10
	97	5	-	-	3	-	-	-	-	-	7	1	-	-	160	14	26	8

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	50%	00%	00%	+67%
'91	17%	00%	00%	-67%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	266	Dec:	-
	'91	799		-
	'97	260		-

Trend Study 24-12-97

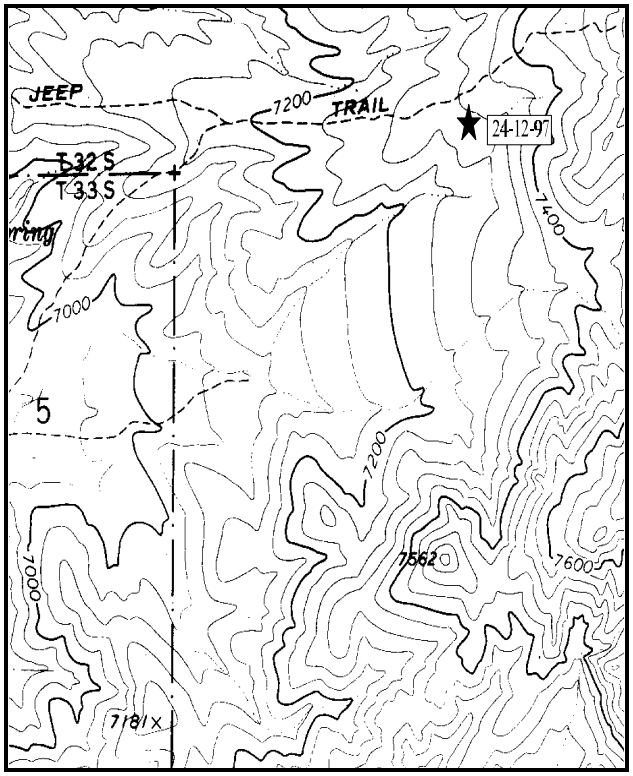
Study site name: Marshall Basin . Range type: Chained, Seeded Pinyon-Juniper

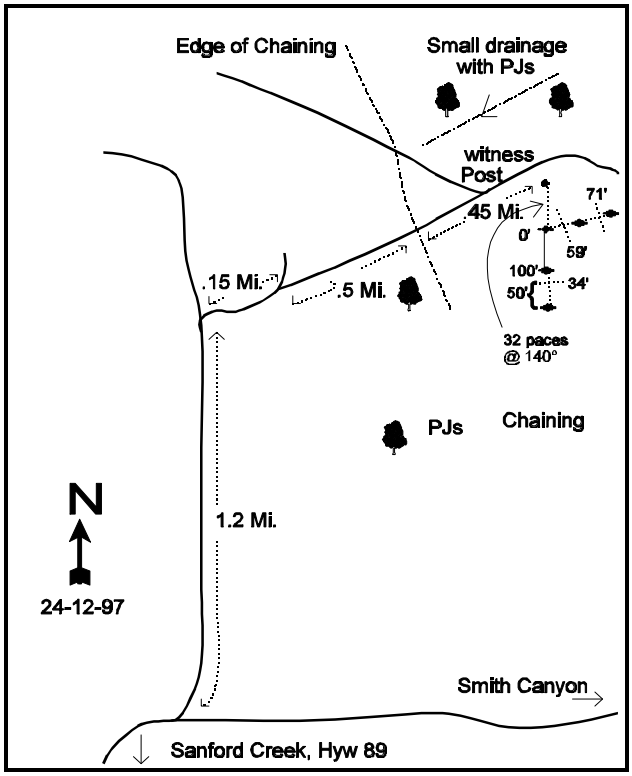
Compass bearing: frequency baseline 170 degrees.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

About 8 miles north of Panguitch on Highway 89 (or 1.5 miles south of the SR20 and Highway 89 junction), turn east onto the Sanford Creek Road. Travel 4 miles east on the main road to a fork. Bear left towards Smith Canyon. Go 1.5 miles to a fork just below the mouth of Smith Canyon, turn left. Continue 1.2 miles to a fork. Stay right and go 0.15 miles to another fork. Stay right and continue 0.5 miles to the edge of a chaining. Continue 0.45 miles east into the chaining to the study area. The witness post marking the transect is a 2 foot tall fencepost, 30 feet off the right side of the road. The 0-foot baseline stake is 164 feet south, and marked with a browse tag #9003.





Map Name: Blind Spring Mountain Diagrammatic Sketch

Township 32S , Range 4 1/2W , Section unsurv. UTM 4204196.960 N, 384056.446 E

DISCUSSION

Trend Study 24-12 (50-12)

The Marshall Basin site monitors trend on a chained and seeded pinyon-juniper area in Marshall Basin. It is located on the western slope of the herd unit. Approximately 900 acres were chained and seeded in the fall of 1984 as part of a cooperative project involving the Powell Ranger District and the Division of Wildlife Resources. Elevation of the site is approximately 7,320 feet. The chained area consists of alluvial benches which gradually slope westward toward the Sevier River. Steep, wooded slopes provide a significant amount of cover above the chaining. Protective cover is also present in the draws which traverse the chained area. This is thought to be a key wintering area for mule deer. Quadrat frequency of deer and elk pellet groups are fairly abundant at 20% and 21% respectively.

Soils are fairly deep with an effective rooting depth (see methods) estimated at nearly 18 inches. The texture is a sandy loam. The soil surface is quite loose and much of it is exposed. Erosion pavement is quite common and was present prior to the chaining. Litter makes up a large part of the groundcover on this site, 41% in 1997. Scattered debris from the chaining and litter buildup from ungrazed grasses help to stabilize the soil on this site.

The chaining project was initiated to increase browse on deer winter range, but shrubs have been slow to become established on this chaining. The area is presently more valuable to deer during the spring and fall, at which time the area provides quality, succulent forage. No key browse species are present in adequate numbers, but mountain big sagebrush, rubber rabbitbrush and bitterbrush would be expected to increase on the site in time.

The herbaceous understory provides 87% of the vegetation cover on the site. The key grass species is crested wheatgrass which accounts for 86% of the grass cover. Intermediate wheatgrass was seeded and would be expected to increase on this site, but presently it is not very abundant. Crested wheatgrass has increased in nested frequency with each reading likely indicating that the site is too dry for the intermediate wheatgrass. The site supported a variety of forbs in 1987 but many were weedy invaders and/or increasers. Due to the prolonged drought, many forbs have disappeared from the site and only five species were encountered in 1997. These combined to produce less than one-tenth of one percent cover.

1991 TREND ASSESSMENT

Basic cover trends did show some notable changes that should not be considered good even though percent bare ground did decrease since 1987 from 17% to 12%. Vegetative cover also declined during this same period along with the combined value for rock and pavement increasing from 17% up to 32%. Trend should be considered sightly downward. There are no noteworthy browse species of any consequence on the site at this time, but through time sagebrush should come onto the site. Seeded crested wheatgrass still dominates the site. The herbaceous understory has lost many forbs since 1987. The forbs have gone from 14 species down to six in 1991. The seeded alfalfa and small burnet were two of the species not found in 1991. However, some of the forbs which have disappeared from the site included weedy early seral species. This was probably a direct result of the extended drought along with increased competition from crested wheatgrass. Another seeded grass, intermediate wheatgrass, did not increase, but stayed at almost the same frequencies as noted in 1987. It has been too dry for this species to increase it's presence on this site. Trend for herbaceous understory is considered stable due to the loss of weedy forbs and a similar sum of nested frequency for grasses.

TREND ASSESSMENT
soil - slightly downward
browse - no key species on site at this time since chaining
herbaceous understory - stable

1997 TREND ASSESSMENT

Trend for soil is considered stable even though percent bare ground increased from 12% to 21%. Pavement and rock cover both declined substantially. Litter cover also declined but this would be expected as litter debris from the chaining deteriorates over time. Vegetative cover is moderately abundant with an average cover value of 16%. Nearly all (87%) of this cover comes from herbaceous plants which are more effective at protecting the soil. Trend for browse is slightly up with some sagebrush and bitterbrush sampled in 1997. They occur in small numbers but will likely increase in time. Trend for the herbaceous understory is stable with a change in composition. Nested frequency of crested wheatgrass increased significantly, but nested frequency of bottlebrush squirreltail and blue grama declined significantly and Sandberg bluegrass was not encountered. In 1987, squirreltail had a nested frequency slightly higher than crested wheatgrass, 88 compared to 103. In 1991, nested frequency of squirreltail was 106 and quadrat frequency was 44%. By 1997, nested frequency declined to only 3 and quadrat frequency to 1%. Forbs are still rare.

TREND ASSESSMENT
soil - stable
browse - slightly up, but inadequate for a winter range
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 24 , Study no: 12

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
G	Agropyron cristatum	$_{a}$88	$_{a}$124	$_{b}$225	41	53	83	11.48
G	Agropyron intermedium	2	3	8	2	2	4	.07
G	Bouteloua gracilis	$_{c}$100	$_{b}$55	$_{a}$17	39	25	8	.21
G	Bromus tectorum (a)	-	-	86	-	-	32	1.47
G	Festuca ovina	4	-	-	2	-	-	-
G	Oryzopsis hymenoides	3	8	1	2	5	1	.01
G	Poa secunda	5	6	-	2	2	-	-
G	Sitanion hystrix	103	106	3	51	44	1	.03
Total for Grasses		305	302	340	139	131	129	13.28
F	Astragalus spp.	$_{a}$1	$_{b}$16	$_{a}$-	1	9	-	-
F	Chenopodium album (a)	$_{b}$12	$_{ab}$3	$_{a}$2	6	2	1	.01
F	Cryptantha fulvocanescens	$_{b}$24	$_{b}$21	$_{a}$-	12	10	-	-
F	Cruciferae	-	1	-	-	1	-	-
F	Cryptantha spp.	-	-	10	-	-	4	.05
F	Descurainia spp. (a)	-	-	2	-	-	1	.00

Type	Species	Nested Frequency '87	'91	'97	Quadrat Frequency '87	'91	'97	Average Cover % '97
F	Eriogonum hookeri (a)	51	-	-	24	-	-	-
F	Erigeron pumilus	1	-	1	1	-	1	.00
F	Ipomopsis aggregata	4	-	-	2	-	-	-
F	Lactuca serriola	$_{b}$118	$_{a}$-	$_{a}$-	49	-	-	-
F	Lesquerella ludoviciana	$_{ab}$3	$_{b}$8	$_{a}$-	1	4	-	-
F	Medicago sativa	$_{b}$11	$_{a}$-	$_{a}$-	7	-	-	-
F	Phlox longifolia	-	-	1	-	-	1	.00
F	Salsola iberica (a)	$_{c}$91	$_{b}$12	$_{a}$-	39	6	-	-
F	Sanguisorba minor	$_{b}$8	$_{a}$-	$_{a}$-	4	-	-	-
F	Taraxacum officinale	3	-	-	1	-	-	-
F	Tragopogon dubius	1	-	-	1	-	-	-
Total for Forbs		328	61	16	148	32	8	0.07

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 24 , Study no: 12

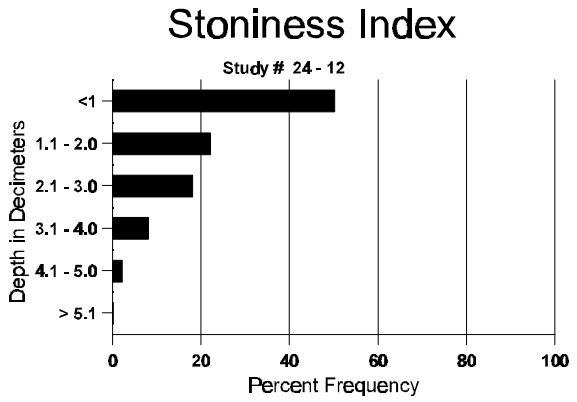
Type	Species	Strip Frequency '97	Average Cover % '97
B	Artemisia pygmaea	-	.18
B	Artemisia tridentata vaseyana	1	-
B	Chrysothamnus nauseosus albicaulis	9	.30
B	Gutierrezia sarothrae	4	.21
B	Juniperus osteosperma	1	.85
B	Opuntia spp.	6	.24
B	Pinus edulis	3	.15
B	Purshia tridentata	1	-
Total for Browse		25	1.94

BASIC COVER --
Herd unit 24 , Study no: 12

Cover Type	Nested Frequency '97	Average Cover % '87	'91	'97
Vegetation	272	6.75	4.00	16.23
Rock	173	7.25	4.25	2.74
Pavement	324	9.75	28.25	18.25
Litter	393	59.00	51.50	41.13
Cryptogams	8	0	0	.09
Bare Ground	289	17.25	12.00	21.42

SOIL ANALYSIS DATA --
Herd Unit 24, Study no: 12

Effective rooting depth (inches)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
17.8	52.4 (17.7)	N/A	57.3	24.1	18.6	2.0	24.6	188.8	.5



PELLET GROUP FREQUENCY --
Herd unit 24 , Study no: 12

Type	Quadrat Frequency '97
Rabbit	8
Elk	20
Deer	21

BROWSE CHARACTERISTICS --
Herd unit 24 , Study no: 12

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	0		-
	'91	0		-
	'97	20		-

Chrysothamnus nauseosus albicaulis																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66	19	13	2
	91	2	-	-	-	-	-	-	-	-	2	-	-	-	66	28	17	2
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	32	45	5
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
X	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	00%	00%	+70%
'97	00%	00%	09%	

Total Plants/Acre (excluding Dead & Seedlings)			Dec:	
	'87	66		0%
	'91	66		0%
	'97	220		9%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	20	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	None
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	0		-

Gutierrezia sarothrae																		
Y	87	3	-	-	-	-	-	-	-	-	3	-	-	-	100			3
	91	-	1	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	87	11	-	-	-	-	-	-	-	-	11	-	-	-	366	9	10	11
	91	23	2	1	-	-	-	-	-	-	24	-	2	-	866	7	8	26
	97	10	-	-	-	-	-	-	-	-	10	-	-	-	200	9	13	10
D	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	1	-	-	-	-	-	-	-	-	-	1	-	33			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+50%
'91	14%	04%	11%	-79%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	466	Dec:	0%
	'91	932		4%
	'97	200		0%

Juniperus osteosperma																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	87	2	-	-	-	-	-	-	-	-	2	-	-	-	66			2
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33	3	7	1
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	3	13	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	-50%
'91	00%	00%	00%	+73%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	66	Dec:	-
	'91	33		-
	'97	120		-

Pinus edulis																		
S	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	87	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	91	1	-	-	-	-	-	-	-	-	1	-	-	-	33			1
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	+ 0%
'91	00%	00%	00%	+45%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	33	Dec:	-
	'91	33		-
	'97	60		-

Purshia tridentata																		
Y	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	1	-	-	-	-	-	-	-	1	-	-	-	20			1
M	87	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	91	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	40	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'87	00%	00%	00%	None
'91	00%	00%	00%	Appeared
'97	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'87	0	Dec:	-
	'91	0		-
	'97	20		-

SUMMARY

WILDLIFE MANAGEMENT UNIT - 24 - MT DUTTON

The overall trend for the herd unit is improved since 1991. The three low elevation winter range sites, North Pole Canyon (#1), Deer Creek Bench (#2), and North Bull Rush (#3) had downward trends in every category in 1991, currently only North Pole Canyon shows stable to upward trends in all categories. Cow Creek (#7), Prospect seeding (#8), and Barnhurst Ridge (#10), higher elevation winter range sites also showed downward trends in all categories in 1991, now all have stable soil trends, yet all still have slightly downward trends for browse. Only Barnhurst Ridge (#10) has a downward trend for herbaceous species. One common factor on more than half of the sites in the unit is a poor herbaceous understory, especially for forbs. Many sites have very few forbs which are important spring forage for wildlife. A trend summary table follows.

Site	1991			1997		
	Soil	Browse	Grasses & Forbs	Soil	Browse	Grasses & forbs
24-1 North Pole Canyon	0	-	-	0	+	0
24-2 Deer Creek Bench	-	-	-	+	0/-	+
24-3 North Bull Rush	-	-	-	0	-	0
24-4 Mud Springs Chaining	-	+	0	0	0	0
24-5 Suicide	-	+	+	0	+	-
24-6 Table Mountain	+	+	+	0	+	0
24-7 Cow Creek	-	-	-	0	-	0
24-8 Prospect Seeding	0	-	-	0	-	+
24-9 Mud Spring	-	+	0	0	-	0
24-10 Barnhurst Ridge	-	-	0	0	-	-
24-12 Marshall Basin	-	0	0	0	+	0

(+) = upward trend, (-) = downward trend, (0) = stable trend, (NR) = not read